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## THE PREVENTION AND CONTROL OF CANCER: A PLAN FOR NATION-WIDE ORGANIZATION\*

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Without attempting to analyze the various causes which have led to a steady rise in the tide of cancer mortality, the fact remains that the annual increase in the number of deaths caused by cancer constitutes a major problem in public health and preventive medicine.

If we were without time-tried and effective means of opposing this increase, inaction might be excusable. This, however, is far from the case. A substantial reduction in the cancer mortality rate is not only possible, but the means to this end are susceptible of practical application. That the problem of organizing these means and of effectively resisting the increase in cancer mortality is difficult is freely admitted. Yet the rewards to be realized in the conquest of the fear of cancer, in the direct saving of human life, and in the mastery of the most relentless disease in the roster of human ills are so rich as fully to justify a supreme and coordinated effort to this end.

The Bone Act, establishing the National Cancer Institute, with its broad provisions for cooperation with the States, which are implicit in the act, the long-existing cooperative relations which obtain between the United States Public Health Service and the State departments of health, the commencing recognition by States, through legislative act, that the cancer problem is, in fact, a public health problem, all inspire the hope that a Nation-wide official organization to combat this disease should, commensurate with its degree of perfection, produce results, perhaps not so dramatic as has been the case in tuberculosis, but still amply repaying the efforts put forth to that end.

This campaign to be effective should be—

1. Nation-wide in its scope.
2. Constitute a preventive activity of each State department of health.
3. Enlist the cooperation of State medical societies and of State cancer commissions.
4. Bring about the achievement of certain specific ends, known to be effective against cancer, yet robbed of controlling power because of the lack of sufficient application.

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The steps in the evolution of such an organization are well-defined, and susceptible of development in orderly sequence. They are as follows:

(A) The first requirement is a central organization in the Federal Government to supply leadership, to foster the development of State programs, to furnish training in the diagnosis and treatment of cancer, to undertake research—experimental, clinical, and therapeutic, to disseminate information both popular and scientific, and to evaluate the results of preventive and control measures.

This central organization we already possess in the National Cancer Institute. Implicit in the Bone Act, which created it, is the establishment in that Institute of a Division of State Relations through which it may cooperate with the States in the campaign against cancer. This division should be organized at once in the National Cancer Institute. It may be remarked in passing that among the present personnel of the Public Health Service there are a number of officers who, by virtue of their experience in cooperative activities with State health departments in organizing and promoting other public health projects, have the background, the vision, and the savoir faire to operate effectively in charge of such a division.

(B) The second step to be achieved is the recognition, by States, through legislative enactment, of cancer as a public health problem and to implement the attack on cancer by establishing, in each State department of health, a division of cancer control. Four States have already led the way (Connecticut, Georgia, Massachusetts, and New Hampshire). The other States should follow in the footsteps of these leaders with the least practicable delay.

(C) *Type of State legislation required.*—The fundamental provisions of the Georgia "Cancer Law" form an excellent pattern upon which legislation enacted by other States might well be based. Under this law, among other things, the State department of health is charged with—

(1) Establishing a standard for the organization, equipment, and conduct of cancer units or departments in general hospitals in the State; (2) conducting an educational campaign for cancer control; (3) providing a plan for the care and treatment of indigent persons suffering from cancer; (4) acquiring such laboratories, hospitals, or other property, real or personal, by gift, purchase, or otherwise as is necessary to carry out the provisions of the act.

#### FUNCTIONS OF A DIVISION OF CANCER CONTROL IN A STATE DEPARTMENT OF HEALTH

The primary functions of a division of cancer control in a State department of health are to organize and to integrate all the forces within the State which can operate to reduce cancer mortality; to act, as it

were, as an ignition system to explode these forces into concurrent action.

(NOTE.—It may well be suspected that summation of the several factors in the reduction of cancer mortality will operate more forcefully by far in reduction of the cancer mortality rate than the expected effect of each one of them separately considered; e. g., the pasteurization of milk plus purification of public water supplies on the typhoid fever rate.)

So much for a general statement. More specifically the following activities, aimed at effecting a reduction in the State mortality rate from cancer, are both desirable and practicable

#### COOPERATION WITH THE STATE CANCER COMMISSION

The division of cancer control should maintain close personal relations with the cancer commission of the State medical society, which should act as a consulting and advisory body to the State department of health. The State cancer commission may be expected to lend forceful aid in securing the enactment of legislation by which the State department of health may undertake preventive action against cancer. This has been well illustrated in the State of Georgia, where the State cancer commission and, particularly, its Chairman, Dr. J. L. Campbell of Atlanta, were responsible for initiating and largely for bringing about the enactment of the Georgia "Cancer Law."

#### COOPERATION WITH THE MEDICAL PROFESSION

In almost no disease is the cooperation of the medical profession in preventive efforts needed to a greater extent than in cancer. Up to the present time, preventive efforts in nearly all the States have been carried out through the cancer commissions of the State medical societies and by individual members of the profession, interested in cancer and impressed by the great preventable loss of life caused by ignorance, procrastination, and ineffective or mistaken therapy.

The cancer control division of the State department of health must necessarily rely upon the medical profession of the State for the early detection of cancer, for persuading the patient to decisive action, for staffing the cancer treatment centers, and for aid in lectures, speeches, and demonstrations in the campaign for popular education in regard to cancer, a necessary feature of the State program.

For these reasons it is incumbent upon the division of cancer control to foster and maintain the closest personal contacts with the medical profession of the State, and to win their approval and support in the efforts of the division in the fight against cancer.

#### PROMOTION OF EARLY DIAGNOSIS

Here, the objectives to be gained are fourfold:

1. *The education of the general public* as to the early signs and symptoms of cancer. This is attained in the usual way through educational

campaigns, lectures, articles in the daily press, radio broadcasts, and the preparation and distribution of literature. In this connection cooperation with the Women's Field Army of the American Society for the Prevention and Control of Cancer should be sought. If the Women's Field Army of the State has been effectively organized, this should be a powerful educational influence.

2. *The education of the medical profession* as to the technical aspects of early diagnosis, the performance of biopsies, the location of cancer treatment centers. This can be done by addresses before county medical societies, circular letters to the medical profession, and through holding clinics for the instruction of the profession at the various cancer treatment centers in the State.

3. *State diagnostic service.*—The operation of a State service for the microscopic diagnosis of tissues of neoplastic origin only. Other tissues should be refused examination. As this service is intended for the indigent only, the physician submitting the specimen should be required to certify that the patient is unable to pay for a microscopic diagnosis.

This service will be found of great utility to physicians, especially those in rural sections. The Georgia experience shows that physicians find the service of assistance to them in making diagnoses of epitheliomas of the skin and of the buccal cavity, carcinoma of the cervix, rectal cancer, lymphomas and similar growths. The precancerous state of other lesions is also detected and the physician, from the information in the report of examination, is enabled to take steps to avert subsequent carcinomatous transformation of the lesion.

4. *Improvement of existing facilities for the treatment of cancer.*—One of the first activities of a newly established division of cancer control in a State department of health should be that of taking stock of existing facilities for the treatment of cancer. These will be found in two categories: the regularly organized cancer treatment centers and unorganized facilities consisting of individual surgeons, physicians possessing radium, and radiologists owning deep therapy X-ray units. These unorganized facilities will be found scattered at various points throughout the State.

*Organized cancer treatment centers.*—These centers are usually departments or clinics in general hospitals, avowedly organized for the effective treatment of cancer. When well organized and adequately staffed, such centers wed expert knowledge to enthusiastic cooperation in an effort to carry out the best type of treatment for each kind of malignant neoplasm. They constitute the most effective diagnostic and curative agency at our command against cancer. Such centers make "planned treatment" realizable for the cancer patient. The basic curative force in such centers is the powerful triad found in the

cooperation of the surgeon, the pathologist, and the radiologist, reinforced by the other medical services commonly represented on the staffs of general hospitals, such as the ophthalmological, otological, laryngological, gastrolgical, urological, dermatological, and neurological services. The physical equipment in such centers always includes modern appliances and facilities for surgery, both diagnostic and therapeutic X-ray apparatus, radium, and a clinical laboratory with facilities for carrying out pathological diagnosis and clinical laboratory procedures.

*Unorganized facilities.*—These will be found to consist usually of individual surgeons especially interested in the surgical treatment of cancer but who are not members of the staff of a regularly organized cancer treatment center; of physicians owning certain amounts of radium; of radiologists who have added deep therapy X-ray units to their diagnostic X-ray equipment.

Once the existing facilities for the treatment of cancer have been surveyed and evaluated, consideration should next be given to the location and distribution of these facilities with respect to the population they are expected to serve. Generally speaking, in a State with average density of population, a cancer treatment center effectively serves a territory represented by a circle of 50-mile radius. In other words, it appears desirable that no cancer patient need travel more than 50 miles to reach a center where he may be effectively treated.

This somewhat arbitrary criterion which, however, seems to work well in practice, is of value in determining, from a geographical standpoint, desirable locations for additional cancer treatment centers.

*Organization of additional centers.*—Whenever a survey of existing facilities for cancer treatment indicates desirable locations for additional centers, the division of cancer control should make every effort to foster the development of such centers. This is done by making contacts with leading physicians of the community, with local medical societies, with chambers of commerce, civic organizations, women's clubs and auxiliaries, and the daily press. Attempts should be made to raise locally the funds for some needed piece of equipment, such as a deep therapy unit. A prerequisite to establishing additional cancer treatment centers is the presence in the community under consideration of a well-equipped and well-staffed general hospital. Generally speaking, no attempts should be made to establish cancer treatment centers in localities where this fundamental facility is lacking. Radium needs for the center could be supplied by making due application to the Surgeon General of the Public Health Service, through the State health officer for an allocation of radium under the Bone Act.

## STATE AID TO INDIGENT SUFFERERS FROM CANCER

One of the most beneficent functions of a division of cancer control is furnishing State aid to indigent sufferers from cancer. Provision for this assistance should be included in every State "cancer law." The total number of cancer patients present at any one time in a State may be estimated at approximately three times the number of annual deaths from cancer. It is also reasonable to assume that one-half of the total number of cancer cases will require aid in financing their treatment. Contact with these indigent patients is best secured by having the family physician apply to the division of cancer control for State aid on behalf of the patient. Some independent agency, such as a local director of relief, or of a county department of welfare, or analogous official, should certify to the patient's inability to pay for treatment. Complete destitution should not be held to be a prerequisite to certification. If this be insisted on, too many victims of cancer, otherwise unable to finance their treatment, would be deemed ineligible for State aid. A convenient standard to apply in determining eligibility for aid is consideration of the question as to whether the financing of treatment would deprive the patient and his family of the necessities of life. State aid to indigent cancer patients should be furnished only at organized cancer treatment centers approved by the State. Attempts should be made to have the county or the township of origin pay a proportionate share of the treatment costs.

## REIMBURSEMENT OF CLINICS

Clinics to which patients are sent for treatment are reimbursed the necessary costs on a predetermined scale for each element entering into the treatment. These elements may conveniently be segregated under each of the following heads: Diagnostic; Surgical; Radiation; Hospital care.

Where hospitalization is required as a feature of the treatment, this cost is included in the aid rendered. When treatment is ambulatory, friends or relatives should be expected to care for the patient's shelter at the point of treatment. Friends or relatives may also, as a rule, be depended upon to transport the patient to the treatment center. Where patients are so completely friendless and destitute as to be unable to meet the slight responsibility of shelter, arrangements can be made to board ambulatory patients, while receiving treatment, in the vicinity of the treatment center at rates much lower than the usual per diem hospital rate.

## CARE OF TERMINAL CASES

Provision for the institutional care of the terminal cancer case, which, from the humanitarian standpoint, must also be envisaged, should be considered separately and apart from measures for cancer

control, in which this phase of the cancer problem does not participate. So far as the control of cancer mortality is concerned, the realistic principle must be adopted (if headway against cancer mortality is to be made) of not granting state aid unless there is a reasonable prospect of arresting the disease. Failure to recognize this principle results in the fruitless expenditure in caring for terminal cases of the funds budgeted for State aid, thus depriving curable cases of their chance for life and health.

#### WHAT MAY BE EXPECTED FROM CONTROL MEASURES

Existing data as to possible reduction in the cancer mortality rate from control measures of the kind just described are too scanty as yet for evaluation. It has been alleged by enthusiasts that a 50 percent reduction in the cancer mortality rate is practicable. It is felt that such an extensive reduction in the death rate is too much to expect, particularly as we are still without an adequate defense against gastric carcinoma, the most frequent and most commonly fatal form (with the exception, perhaps, of malignant melanoma, which, fortunately, is uncommon) of malignant neoplasm. Pulmonary carcinoma, too, must be regarded as a form of cancer for which treatment is unsatisfactory and which appears to be increasing. Considerable improvement both in timely diagnosis and in therapy is needed before the mortality rate from these types of neoplasm can be significantly reduced. Apart from these exceptions it is reasonable to believe that a thoroughgoing and Nation-wide application of the control measures previously outlined would result finally in a reduction of from 25 to 30 percent in the cancer mortality. For the registration area of the United States, reduction of this order would represent an annual saving of about 35,000 to 37,000 lives. Since this number is about equal to the annual number of victims of fatal automobile accidents this surely would be an effect well worth the achieving upon the Nation's cancer mortality rate, which has never remained stationary but has maintained its inexorable advance every year since the registration area for deaths was established in the United States in 1900.

#### PROBABLE COSTS

Reckoning on a Nation-wide scale it is likely that the total number of cases of cancer in the United States during any one year is, roughly, 420,000. Of these it may be expected that one-half, or 210,000, would require assistance in obtaining treatment for their condition. So far, in the State of Georgia, the average cost to the State for each case of cancer treated has been in the neighborhood of \$40. This figure may be taken as a first approximation. Multiplying 210,000 by 40 would place the State contributions to the treatment of indigent sufferers from cancer for the whole country at \$8,400,000. If 10 per-

cent is added to this sum for administration, we have a total of \$9,240,000. Dividing this by 48 we find that the average cost per State is approximately \$200,000. In States with low density of population and low cancer death rate, this average figure would be considerably less. In the more densely populated States with higher cancer death rates, this State contribution would unavoidably be much higher. In the State of Georgia \$50,000 was appropriated annually for 2 years by the State assembly which enacted the cancer law. Owing, however, to the State laws which provide that sums appropriated shall be expended only in the ratio of collected to expected State revenues, the sum available for 1938 was but \$38,000. This sum is clearly inadequate to meet all the requests for State aid arising during the fiscal year. An increase in the amount budgeted for State aid in the treatment of cancer will be required if the degree of control over the cancer mortality rate contemplated by the law is to be exercised.

On the other hand, it is thought that an annual appropriation of \$100,000 should yield satisfactory control over the cancer mortality rate in Georgia, and still constitute a reasonable expenditure in view of the importance of the objective. The relatively low cost of control measures in that State is, of course, due to the low cancer death rate and a correspondingly low level of incidence.

Besides the direct saving of life resulting from State aid in the treatment of cancer in the case of the indigent, it should not be forgotten that the improvement in the facilities for the treatment of the disease, the awakening of "cancer consciousness" in the general public, the education in the curability of early cancer, the education of the medical profession in the early diagnosis of cancer, therapeutic advances, the popularization of annual physical examinations during maturity, with the early detection of cancer in mind, all constitute forces making for the reduction of the cancer mortality rate in that portion of the population able to finance their own treatment. The cumulative effect of the factors just enumerated should be also reflected in significant reductions in cancer mortality.

#### SUMMARY AND CONCLUSIONS

The problem of reducing cancer mortality constitutes a major problem in public health and preventive medicine. The orienting experiences of forward-looking States in cancer control now justify the Nation-wide cooperation of the official health agencies of the Nation in instituting cancer control measures.

A central organization to furnish leadership, stimulus, training in the diagnosis and treatment of cancer, radium loans, and dissemination of professional and popular information exists already in the National Cancer Institute. Participation by States in the attack on

cancer is best secured by organizing, in the several State departments of health, divisions of cancer control to put into operation specific measures within the State to effect reduction in the mortality rate from the disease.

These measures consist of popular education in the signs and symptoms of early cancer, improvement in the facilities for treatment, cooperation with State cancer commissions in educating the medical profession in the early diagnosis, maintenance of State services for the microscopical diagnosis of neoplasms, State aid to the indigent sufferers from cancer, and popularization of annual physical examinations in order to detect early cases.

The thoroughgoing Nation-wide application of such control measures should eventually effect a reduction of 25 to 30 percent in the cancer mortality rate, representing an annual saving of about 35,000 lives. This would offset the mortality due to automobile accidents.

The probable annual cost of such a Nation-wide attack upon cancer to the States would be in the neighborhood of \$10,000,000.

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## EFFECTS OF INTRAMUSCULAR INJECTIONS OF VITAMIN B<sub>1</sub> ON ACUTE LEPROUS NEURITIS AND OF ORAL ADMINISTRATION ON THE GENERAL DISEASE

### A Preliminary Report

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Comments relative to the relation of nutrition and diet to leprosy have appeared in the literature with increasing frequency in recent years. Some writers have suggested that deficiencies of certain of the vitamins apparently have some relation to the incidence of the disease. Others believe that there is a definite relation between the activity of the disease and a deficiency in some particular vitamin. A few investigators have attempted to show such a relationship by the administration of vitamins in various forms in clinical cases.

Wayson<sup>1</sup>, in 1932, reported on his investigations of the therapeutic effect of the addition of a definite amount of an extract of wheat and of yeast to the customary diet of the patients. He selected 3 groups of about 20 patients each, whose ages and leprosy conditions were comparable. One group received daily, for a period of 6 months, 15 grams of an extract of whole wheat evaporated to the consistency of a heavy syrup. The second group received, for the same period, 3 grams of a dried brewer's yeast, suspended in a coffee decoction. The third group served as controls. He found that patients in both of the treated groups showed changes which he stated might be rated as

<sup>1</sup> Annual Report of the Surgeon General of the United States Public Health Service, 1932, p. 27.

showing slightly greater improvement than that in those of the control group but felt that the differences were such as would not permit definite deductions.

Basu<sup>2</sup>, noting occurrence of pellagra in lepers, analyzed their diet and found it to be deficient in proteins and in the vitamin B complex, particularly in vitamin B<sub>2</sub>. Treatment with a vitamin B concentrate from yeast, adjusted to the strength of marmite, 1 teaspoon daily for a month or longer, he reports, caused marked improvement in sensation in cases with nerve involvement but had no effect in the nodular cases. He suggested that vitamin B<sub>2</sub> may be an important factor in the etiology of leprosy.

Brown<sup>3</sup> tested the value of giving vitamin B in the form of marmite and rice polishings. According to his statement no improvement resulted from the treatment.

During the past 2 years we have attempted to determine what effect the administration of vitamin B<sub>1</sub> might have on human cases of leprosy and have employed three preparations in our studies, namely, dried brewer's yeast, synthetic vitamin B<sub>1</sub> concentrate, by mouth, and aqueous solution of synthetic vitamin B<sub>1</sub>, by injection. No improvement was noted which could be credited to the oral administration of yeast or vitamin B<sub>1</sub> concentrate. The results obtained following intramuscular injections of vitamin B<sub>1</sub> in cases of acute leprosy neuritis are very encouraging.

*Dried brewer's yeast.*—Thirty-four patients, whose ages with two exceptions were under 20 years (two being just 20), were divided into two groups, one group to receive the yeast and the other to serve as a control group. The groups were selected as follows: A patient was placed in the group which was to receive the yeast, another patient of the same sex and age and having as nearly as possible the same type of disease and degree of involvement was placed in the control group. This procedure was continued until each group contained 17 patients. Four additional patients, for whom there were no suitable controls, also received the yeast.

Before the treatment was begun, a careful examination was made of each patient with particular attention to involvement of the peripheral nerves as shown by enlargements, muscular atrophies, contractions and disturbance of the superficial tactile and thermal sensations. The areas of disturbed sensation were plotted on anatomical charts.

Each patient in the test group was given twice daily 15 grams of the yeast<sup>4</sup> in pineapple juice. The 38 patients were seen frequently and carefully examined monthly to note any gross changes. After 3 months each was examined in the same manner as before the inau-

<sup>2</sup> Basu, N. K.: *Ztschr. f. Vitaminforsch.* Berne, 3: 194 (1934). *Trop. Dis. Bull.*, 33: 335 (1935).

<sup>3</sup> Brown, James A. K.: *West African Med. J.*, 8: 1. *Trop. Dis. Bull.*, 33: 614 (1936).

<sup>4</sup> The potency of the yeast for vitamins B<sub>1</sub> and B<sub>2</sub> was tested on rats deficient in those vitamins and found satisfactory.

guration of the treatment. At this examination one-half of the body was tested carefully for any changes in the superficial tactile and thermal sensations. The treatment was continued for a total of 6 months, after which a complete examination was again made and any changes in the skin lesions, superficial nerves and superficial tactile and thermal sensations were noted on the charts.

The results of the examinations revealed no improvement for which the administration of the yeast could be held responsible.

*Vitamin B<sub>1</sub> concentrate by mouth.*—A group of 11 children, from 4 to 17 years of age, were given a vitamin B<sub>1</sub> concentrate by mouth over a period of 6 to 8 months. Each received 800 international units daily. During the period of treatment they were frequently seen and examined once each month. As in the previous experiment, each patient was examined carefully before the inauguration of the treatment and at the termination of the period of observation and the findings were noted on anatomical charts. Other children in the hospital served as controls in this study. Two of the patients in this group were also in the group which had received 30 grams of brewer's yeast over a period of 6 months. A comparison of the findings of the two examinations revealed no improvement for which the administration of the vitamin B<sub>1</sub> concentrate could be held responsible. One showed definite improvement, the condition of one remained stationary and that of eight progressed. One of the treated group developed an acute neuritis after having received the concentrate for 8 months.

*Acute leprous neuritis treated with intramuscular injections of vitamin B<sub>1</sub>.*—Acute neuritis is the one painful manifestation of leprosy. It may occur accompanying an acute leprous reaction or as the only acute manifestation of the disease at the time. In some cases a nerve may become markedly swollen, extremely painful, especially on movement of the parts involved, and acutely tender on slight pressure. In contrast to the very severe type there may develop a mild type of neuritis characterized by little swelling and slight tenderness accompanied by a neuralgic type of pain. The acute symptoms may continue for several weeks in some cases or, in a few, may subside in a week or so. Atrophies, contractures, and disturbed superficial sensations may appear as sequelae. Various methods and preparations have been employed in the treatment of cases of severe neuritis, including complete rest of the affected part and the administration of sedative drugs ranging from the mild analgesics to the opiates, as well as injections of adrenalin and ephedrine. Some cases will respond rather readily to these forms of treatment, while in others the neuritis may persist for periods of from 1 to 2 months, with severe suffering for the patient.

During the past few years, investigators have reported rather striking success in the treatment of various forms of neuritis following

injections of vitamin B<sub>1</sub>. In view of these most encouraging reports, it was thought advisable to study the value of such treatment in cases of acute leprous neuritis.

During the past 6 months 10 patients with rather severe acute neuritis of peripheral nerves have been treated with intramuscular injections of vitamin B<sub>1</sub>. The injections were begun as soon as possible after the onset of symptoms, or when the patient first complained of pain. In seven the first injection was given on the day of onset, in one on the second, in one on the fourth, and in one on the fifth day after onset of symptoms. With one exception the procedure followed was to give 300 international units once daily by intramuscular injection and twice daily by mouth. In the exception, a case of very severe neuritis (No. 10), 600 units instead of 300 were given by injection. The first effect noted was relief of pain and then tenderness. About the time that the tenderness had completely disappeared, a diminution in the swelling was noted.

In the 7 patients in whom the injections were begun on the day of onset, the pain had completely disappeared 24 hours after the first injection in 4, in 48 hours in 1, and on the fourth day in another. In one patient, owing to a required emergency treatment, the injections were discontinued after two had been given. On the third day in this case the pain was moderate, after which it continued to lessen in severity until the seventh day, when it was no longer present. Tenderness could no longer be elicited after 24 hours in one and after 3 or 4 days in all but the one patient in whom the treatment was interrupted. In this case no tenderness could be elicited on the seventh day. In each case the tenderness was less marked 24 hours after the first injection. Definite diminution in the swelling was first noted about the time that the tenderness disappeared.

In one case, No. 10, the injection treatment was begun on the second day of symptoms. Twenty-four hours after the injections the pain had definitely lessened, while the tenderness and swelling remained prominent. After three injections the pain had entirely disappeared, and after four injections the tenderness had completely disappeared and definite diminution in the amount of swelling had taken place.

In two cases, Nos. 4 and 9, the injections were begun on the fourth and fifth days of symptoms. In the former the response to treatment was not as abrupt and the improvement was not sharply defined from day to day. On the third day, however, there was considerably less pain, but the nerve was still quite tender and swollen. Definite decrease in the size of the nerve was not noted until after nine injections had been given, at which time there was but slight tenderness. In the other case, in which the injections were begun on the fourth day of symptoms, the results were about as prompt as in the majority of the cases.

## CASE REPORTS

*Case 1, No. 3361.*—Female, part-Hawaiian, aged 25 years. This patient was first admitted to segregation in April 1929 at the age of 14 with early, bacteriologically negative, neural leprosy. She was released from segregation in December of the same year after 8 months' hospitalization and readmitted in November 1935 at the age of 23, with moderately advanced, bacteriologically positive, mixed leprosy.

During the present hospitalization she has had several prolonged periods of activity, alternating with periods of relative quiescence. The skin lesions have progressed, chiefly during periods of activity, developing into the filtrative type.

On September 2, 1937, while the skin lesions were subsiding from a 4-month period of activity, there developed an acute neuritis of the right ulnar nerve characterized by acute pain, accentuated by movement at the elbow, severe tenderness on slight pressure, definite enlargement throughout its palpable course, and accompanied by no increased activity of the lesions of the skin. Administration of vitamin B<sub>1</sub> was started on the first day of the neuritis, 300 international units by intramuscular injection daily and 300 orally twice daily.

September 3, second day: Considerable decrease was noted in the amount of pain both on motion and while at rest. Rather marked tenderness persisted with no notable change in the swelling.

September 5, third day: The pain and tenderness had completely subsided.

September 7, fifth day: Definite decrease in the amount of swelling was noted. The vitamin B<sub>1</sub> therapy was discontinued. The patient had been given 5 daily injections and oral administrations during the same period.

Following the discontinuance of the therapy the nerve continued to decrease in size until it apparently returned to that previous to the attack. There has been no recurrence during 6 months.

*Case 2, No. 3480.*—Female, part-Hawaiian, aged 53 years. First admitted to segregation in April 1929 at the age of 45 years with moderately advanced, bacteriologically negative, maculo-anesthetic leprosy. She was released from segregation in November 1930 after 20 months' hospitalization. This patient was readmitted in July 1937 at the age of 53 with the same type of leprosy but more advanced than on first admission. Three months before admission there had developed a left foot drop. Since admission there has been steady regression of visible activity in all of the lesions with no improvement in the foot drop.

On September 27, 1937, there developed an acute neuritis of the left external peroneal nerve characterized by acute pain, accentuated by both active and passive movements at the knee, severe tenderness on slight pressure, and marked enlargement, and accompanied by no increase in the activity of the skin lesions. The size of the external peroneal was estimated to be approximately twice that existing prior to the onset of the neuritis. Administration of vitamin B<sub>1</sub> was begun, 300 international units by intramuscular injection once daily and 300 orally twice daily.

September 28, 24 hours after beginning of treatment, the pain had entirely disappeared, both while at rest and on movement, and the tenderness had definitely decreased. There was no perceptible change in the size of the nerve.

On September 29, after 3 days of the vitamin B<sub>1</sub> therapy, there was present neither pain nor tenderness on firm pressure, and the size of the nerve had apparently returned to that previous to the attack. The injections were discontinued. There has been no recurrence during the 6 months since the injections were discontinued and no improvement in the old foot drop.

*Case 3, No. 3333.*—Female, Hawaiian, aged 48 years. Admitted to segregation in March 1935 with advanced, bacteriologically positive, mixed leprosy.

On September 28, 1937, after the patient had definitely entered the recessive stage following a 3 months' period of increased activity, there developed an acute neuritis of each of the external peroneal nerves, characterized by pain, tenderness, and swelling. Three months previously, at the onset of the period of activity, the dorsiflexors of each foot had become paralyzed, resulting in a bilateral foot drop and accompanied by no symptoms of acute neuritis. Daily administration of vitamin B<sub>1</sub> was begun, 300 international units intramuscularly and 600 orally.

On September 29, 24 hours after onset of treatment, the pain and tenderness had entirely disappeared. The injections were changed to 3 weekly and the oral administration continued twice daily.

On November 15, after 8 weeks of the vitamin B<sub>1</sub> administration, there was noted slight return of dorsiflexion at both ankles after 5 months of complete foot drop. By February 1938 the return of function was practically complete.

*Case 4, No. 3450.*—Female, part-Hawaiian, aged 11 years, was admitted to segregation in December 1936, at the age of 10, with moderately advanced, bacteriologically positive, mixed leprosy. The lesions were of both the maculo-anesthetic and infiltrative cutaneous types.

On October 13, 1937, there developed an acute neuritis of the right ulnar nerve, characterized by pain, tenderness, and swelling extending from just below the elbow to the upper third of the humerus.

On October 16, after 3 days of acute symptoms, during which there was noted no improvement, a course of treatment was instituted. Three hundred international units were given daily by intramuscular injection and 300 units twice daily by mouth. Response to treatment was not as abrupt in this case as in the preceding cases, and improvement was not sharply defined from day to day. However, by the third day there had occurred considerable decrease in the pain, especially in that experienced on movement. The nerve was still quite tender and swollen. Definite decrease in the size of the nerve was not noted until the treatment had been continued for 10 days, when only slight tenderness remained. The injections were stopped after 11 doses and the oral administration was continued.

*Case 5, No. 3470.*—Male, Portuguese, aged 33 years, was first admitted to segregation in 1918 at the age of 14. He was released from segregation in 1920, and after 17 years was readmitted in July 1937, with advanced bacteriologically positive, mixed leprosy, complicated by active pulmonary tuberculosis. He has been in bed continuously since admission.

On October 14, 1937, there developed an acute neuritis of the left ulnar nerve, characterized by extreme pain, accentuated by movement, severe tenderness, and marked swelling. The point of maximum tenderness was located about 3 inches above the elbow, where a tense fusiform enlargement could be palpated.

Vitamin B<sub>1</sub> therapy was instituted—300 units daily intramuscularly and 300 units by mouth twice daily.

On October 15, 24 hours after receiving the first injection, there was a definite decrease in the amount of pain and tenderness, with no palpable change in the size of the nerve.

On October 17, after 3 days of treatment, pain was elicited only on movement and the tenderness was slight.

On October 18, fourth day of treatment, all pain and tenderness had disappeared and the acute swelling of the nerve was subsiding.

*Case 6, No. 3453.*—Male, Japanese, aged 23 years, was admitted to segregation in June 1937 at the age of 23, with far advanced, bacteriologically positive, cutaneous leprosy, nodular type, and extensive neural involvement.

On November 12, 1937, during a period of acute leprosy activity, there developed an acute neuritis of the right external peroneal nerve, characterized by severe

pain at rest and on movement, with tenderness and swelling being most severe at the point where it crosses the fibula. The administration of vitamin B<sub>1</sub> was begun by injecting intramuscularly 300 international units daily and giving 300 units twice daily by mouth.

On November 13, 24 hours after the first injection, the pain both at rest and on movement had disappeared, while the nerve was still quite tender to pressure. No apparent decrease in size was noted.

On November 14, the third day of the attack and treatment, the tenderness had definitely decreased.

On November 15, the fourth day, all acute tenderness had disappeared and a recession in the amount of swelling was noted. The injections were discontinued, a total of four having been administered. The oral administration was continued for two additional days.

*Case 7, No. 3484.*—Male, Japanese, aged 23 years, was admitted in November 1937 with bacteriologically positive, mixed leprosy, characterized by advanced cutaneous lesions and nerve involvement.

On November 22, 1937, during a severe acute leprosy reaction accompanied by pronounced prostration, there developed an acute neuritis of the right ulnar nerve. The pain was very severe and constant, stabbing in character on passive and active movement. Tenderness was marked, with the point of maximum intensity approximately two inches above the elbow, where a fusiform swelling was evident. The vitamin B<sub>1</sub> therapy was instituted—300 units once a day by intramuscular injection and twice daily by mouth.

On November 23, the third day, the pain was moderate and the nerve was still enlarged and quite tender. At that time a condition, unrelated to the neuritis, developed which required emergency treatment and necessitated discontinuation of the vitamin treatment. However, there was no return of the intense pain of the first day and the tenderness gradually subsided until it was no longer present on the seventh day, at which time the swelling was also subsiding.

On December 13, 3 weeks after the onset of the neuritis and 19 days after discontinuance of the vitamin B<sub>1</sub> therapy, there developed a recurrent attack of the neuritis of the right ulnar nerve accompanied by acute neuritis of the left ulnar and both external peroneal nerves, with about the same intensity in each as was experienced with the first attack. Daily administrations of 300 units of the vitamin intramuscularly and 600 by mouth were again begun.

Within 24 hours of the first injection all pain had disappeared and within 4 days all tenderness had disappeared and the swelling had begun to subside. Improvement developed in the three nerves concurrently. After the fourth day the number of injections was changed to three times a week. No recurrences have taken place during two and one half-months on this regime.

*Case 8, No. 3457.*—Female, part-Hawaiian, aged 50 years, was admitted to segregation in May 1937 with bacteriologically positive, mixed leprosy in which neural manifestations predominated. Included among the neural findings were bilateral drop of wrist and foot.

On December 6, 1937, there developed an acute neuritis of both external peroneal nerves, with pain, tenderness, and swelling of about the same intensity in each, and evident chiefly where the nerves lie over the upper portion of the fibulae. The vitamin B<sub>1</sub> therapy was begun with the daily administration of 300 units intramuscularly and 600 units by mouth daily.

On December 9, the third day of treatment, the pain had completely disappeared, and on the following day the tenderness had likewise disappeared. The swelling was definitely subsiding on the tenth day of treatment.

The injections were continued for a total of 16 days, and the oral administration to date, 3 months after the attack, with no recurrence of acute neuritis and no clearing of the paralyses.

*Case 9, No. 3416.*—Female, part-Hawaiian, aged 13, was admitted to segregation in October 1936 at the age of 12, with advanced, bacteriologically positive, mixed leprosy.

On January 24, 1938, there developed an acute neuritis of the right ulnar and right radial nerves, characterized by pain, tenderness, and swelling. The maximum point of tenderness and swelling of the ulnar nerve was just above the elbow, and that of the radial at the wrist, where the superficial branch was palpable over the distal portion of the radius.

On January 28, the fourth day after onset, there had been no noticeable improvement, and so an intramuscular injection of 300 international units of vitamin B<sub>1</sub> was given.

On January 29, 24 hours after the injection, there was still some pain on movement but none while the arm was at rest. Both nerves were still quite tender, with no palpable decrease in the swelling.

On January 31, 3 days after the injection, all pain had disappeared and the swelling of both nerves was subsiding. Slight tenderness to pressure was still present, so another injection of 300 units was given.

On the following day, February 1, all tenderness had disappeared. Injections of 300 units had been given on the fourth and seventh days after onset.

The patient had had a previous attack of acute neuritis. One week after admission she had an attack of acute neuritis of the left ulnar nerve, with pain, severe tenderness, and marked swelling. The treatment consisted of complete rest in bed with the arm elevated in a sling and protected from motion and trauma. It was not until 20 days after the onset that the pain and tenderness had disappeared and the swelling had begun to subside.

*Case 10, No. 3142.*—Female, part-Hawaiian, aged 25, was admitted to segregation in April 1932, at the age of 19, with moderately advanced, bacteriologically positive, mixed leprosy. Since admission the disease has progressed and is at present classed as advanced. This patient has also developed advanced pulmonary tuberculosis and tuberculosis of the spine with psoas abscess formation.

On March 10, 1938, there occurred an acute neuritis of the left ulnar nerve, characterized by paresthesias and severe pain. The patient did not report the condition until the day after onset.

On March 11 there was severe pain, accentuated on slight movement. The tenderness was extreme. There was definite enlargement of the nerve, the extent of which could not be determined on account of the extreme tenderness. The administration of vitamin B<sub>1</sub> was begun, with daily administrations of 600 units both orally and intramuscularly.

On March 12, the third day of the neuritis and 24 hours after the first injection of 600 units, there was very little pain, spasmodic in character and of short duration, with arm at rest. Painless motion was possible at the elbow between extension and 90° flexion. The tenderness and swelling remained prominent.

On March 13, after 2 injections, the pain with the arm at rest had disappeared, and the arm could be painlessly flexed at the elbow to within approximately 15° of complete flexion. Tenderness was slightly less.

On March 14, after 3 injections, the pain had entirely disappeared while at rest or on movement. The tenderness and swelling had definitely decreased.

On March 15, after 4 injections, pain and tenderness were no longer present and the swelling had apparently subsided. The injections were continued through March 17 for a total of 7 daily doses.

## DISCUSSION

The results obtained in the few cases of acute leprous neuritis reported here strongly suggest that material benefit is derived from intramuscular injections of vitamin B<sub>1</sub>. Our experience also suggests that similar results are not obtained by the oral administration of that vitamin. No improvement was noted following administration, for over a 6-month period, either of large doses of brewers' yeast or of vitamin B<sub>1</sub> concentrate. On the contrary, acute neuritis developed after the vitamin B<sub>1</sub> concentrate was given, in one case for 6 months (case 4) and in another for 8 months (case 9).

In this preliminary study all patients suffering with acute neuritis were treated by injections of vitamin B<sub>1</sub> and no parallel control cases were followed. However, our records of a few cases treated by other methods in the past suggest that the duration of the acute symptoms was apparently much longer than in these treated cases. In one of this series of cases (case 9) there had occurred a previous attack of acute ulnar neuritis in which the pain and tenderness had persisted for 24 days, while the duration of pain in the present attack was for but 3 days and of tenderness for 4 days after vitamin B<sub>1</sub> injections had been begun. In 5 other cases of neuritis the acute symptoms persisted for periods of from 14 to 27 days. This study is being continued with a change in procedure. Alternating cases will be treated with the vitamin B<sub>1</sub> injections, while the others will be treated by the methods previously employed.

The effects of this injection treatment on old manifestations of nerve involvement is problematical. In one case in which there had been a bilateral foot drop previous to the onset of the acute neuritis, there occurred definite improvement following the injection treatment. However, similar results have been obtained in cases treated otherwise.

A study to determine, if possible, what prophylactic value the injection of vitamin B<sub>1</sub> might have is in progress. It is hoped that, by such injections, attacks of acute neuritis may be prevented.

It is likewise hoped that, by shortening the course of the acute neuritis, complications, such as atrophies and contractures, may be prevented.

No attempt will be made at this time to explain the mode of action of the vitamin B<sub>1</sub> following intramuscular injection in these cases of neuritis. We believe, however, that there is lacking evidence which would suggest that the acute neuritis is due to a specific vitamin B<sub>1</sub> deficiency. One patient (case 4) had received vitamin B<sub>1</sub> concentrate, 300 international units 3 times weekly for 6 months, and was still receiving the concentrate when there developed an acute neuritis. Another case (No. 9) had been receiving 600 international units daily for a period of 8 months when she developed an acute neuritis.

This case was in the group in which the effects of oral administration of the vitamin B<sub>1</sub> concentrate were studied. If the vitamin was being absorbed from the intestinal tract, the possibility of a vitamin B<sub>1</sub> deficiency in these two cases appears remote.

The very sudden onset with marked edema and swelling of the nerves suggests that toxicity plays an important role in these cases of leprous neuritis. Further investigations might show that the injection of vitamin B<sub>1</sub> may have some action relative to toxicity.

#### CONCLUSION

A small series of cases of acute leprous neuritis has been treated with intramuscular injections of vitamin B<sub>1</sub> with rather spectacular results. The study must be continued on a large group of cases, well controlled, before the value of such treatment can be determined definitely.

### STUDIES ON OXYURIASIS

#### XVI. THE NUMBER OF EGGS PRODUCED BY THE PINWORM, *ENTEROBIUS VERMICULARIS*, AND ITS BEARING ON INFECTION<sup>1</sup>

By LUCY REARDON, *Junior Zoologist, National Institute of Health, United States Public Health Service*

In connection with the life history of *Enterobius vermicularis* it has been noted in previous papers in this series (1, 2, 3) that the gravid

<sup>1</sup> Other studies of this series:

I. Types of anal swabs and scrapers, with a description of an improved type of swab. By Maurice C. Hall. *Am. J. Trop. Med.*, 17: 445-453 (1937).

II. A preliminary note on treatment with tetrachlorethylene. By Willard H. Wright, John Bozicevich, and Joseph Rose. *Virginia Med. Monthly*, 64: 339-341 (1937).

III. The incidence of pinworm infestation in a group of 230 boys in Washington, D. C. By John Bozicevich. *Med. Ann. District of Columbia*, 6: 239-241 (1937).

IV. Some aspects of the problem of therapy. By Willard H. Wright and Eloise B. Cram. *Am. J. Dis. Children*, 54: 1276-1284 (1937).

V. Therapy with single doses of tetrachlorethylene. By Willard H. Wright, John Bozicevich, and Leon S. Gordon. *J. Am. Med. Assoc.*, 109: 570-573 (1937).

VI. The incidence of oxyuriasis in 1,272 persons in Washington, D. C., with notes on diagnosis. By Eloise B. Cram, Myrna F. Jones, Lucy Reardon, and Mabelle O. Nolan. *Pub. Health Rep.*, 52: 1490-1504 (1937).

VII. Clinical improvement following treatment with single doses of tetrachlorethylene. By Willard H. Wright, John Bozicevich, and Leon S. Gordon. *Am. J. Trop. Med.* (In press.)

VIII. A preliminary note on therapy with gentian violet. By Willard H. Wright, Frederick J. Brady, and John Bozicevich. *Proc. Helm. Soc., Wash.*, 5: 5-7 (1938).

IX. The familial nature of pinworm infestation. By Eloise B. Cram. In manuscript.

X. Artifacts in "cellophane" simulating pinworm ova. By Lucy Reardon. *Am. J. Trop. Med.*, 18: (1938). (In press.)

XI. Dermal and intradermal skin reactions in oxyuriasis. (By title.) By Willard H. Wright and John Bozicevich. *J. Parasitol.*, 23: 562 (1937).

XII. Epidemiological findings in Washington, D. C. By Eloise B. Cram and Lucy Reardon. In manuscript.

XIII. Problems presented by a family of seven, all infested with pinworms. By Myrna F. Jones, Eloise B. Cram, and Willard H. Wright. In manuscript.

XIV. Controlled tests with various methods of therapy. By Willard H. Wright, Frederick J. Brady, and John Bozicevich. In manuscript.

XV. A study of 504 boys in a boys' camp. By John Bozicevich and F. J. Brady. *Med. Ann. District of Columbia*. (In press.)

female migrates from the rectum through the anus to the perianal region and deposits her eggs on the skin, and that these eggs become scattered throughout the household, resulting in familial infections (4). Unpublished findings indicate that eggs can be recovered, by suitable techniques, from floors, rugs, chairs, beds, and other places. It is desirable that we have some mental picture of this in order to estimate the danger of infection. We know that an infection may be so light that there may be a migration of only one worm in the course of several days, or so heavy that a considerable number of worms may migrate every night. If we know the number of eggs produced by each gravid female, we can then form an estimate as to the probable extent of the household infection resulting from the presence of one infested individual or several such individuals. To ascertain the number of eggs produced by a female worm, actual counts of eggs in 20 gravid specimens of *Enterobius vermicularis* have been made. The technique is here described, previous records in the literature are noted, and the present counts are discussed.

#### TECHNIQUE

The majority of worms were fixed in 10 percent formalin; two were fixed in Bouin's, and one in hot alcohol; approximate measurements of the worms were made with a stage micrometer and dissecting microscope; to intensify definition of ova, all worms, previously soaked in N/10 NaOH for about 24 hours, were stained for an equal time in the blue rayon dye which has been discussed by Hall (5); counts were made on specially manufactured rhodium-plated 2-inch by 3-inch slides outlined in 1-mm squares.

On each of four ruled slides, three drops of glycerin from a dropping bottle (pipette form) were placed. A stained worm was put on one slide in the glycerin. Under the lens of the dissecting microscope the worm was cut with an iris knife into approximate quarters, one of which was left on the slide, and three of which were deposited severally in the glycerin on the three remaining slides. Each portion of worm was teased with iris knife and dissecting needle until all ova were dispersed somewhat evenly. Knife and needle were stroked on the slide near the egg-laden glycerin to free them from adhering eggs, and 24 by 50 mm cover slips were applied to the preparation. These preparations will keep for days in condition for counts if protected from dust and jolts. Ova were counted under a compound microscope with 5 X oculars and 16 mm objective, and tallied with a Veeder hand counter.

Prior to adoption of this technique, counts on five worms were made by the author and other members of the staff. In making these counts, eggs were pipetted from a container to a slide; but this method was not accurate, since many ova adhered both to the pipette and the

container and it was impossible to make an accurate count of the eggs. For this reason, these counts, which were, respectively, 8,013, 7,197, 6,144, 16,105, and ca. 8,000 are not included in the accompanying table. However, these counts are all within the range of the figures for the counts in the table.

#### PREVIOUS RECORDS

Four of the published references on the number of ova in a gravid specimen of *Enterobius vermicularis* (6, 7, 8, 9) are based on Leuckart (10), and cite 10,000 to 12,000 for the number of ova in a mature female. These figures were used by Leuckart in reference to a worm partially filled with eggs. In a footnote he calculated the number to be not less than 20,000.<sup>2</sup> Cobb (11) also cites 20,000 as a moderate estimate of the number of eggs in an adult female. Fiebiger (12) says that the mature female is completely filled with 8,000 to 12,000 eggs. Wilhelmi and Quast (13) made actual counts on two worms and enumerated 12,946 and 12,768 eggs, respectively. Miretsky (14), in estimating the number of eggs in *Enterobius vermicularis*, used a 10-percent solution of caustic soda to destroy the worm tissues and leave free the eggs. A suspension of the eggs was obtained and their number calculated with blood-counting pipette and chamber. The number of eggs so calculated is stated to be from 13,000 to 16,000.

#### PRESENT COUNTS

Table 1 shows the results of counts of 20 worms:

TABLE 1.—*Egg counts, together with source and size of worms, for Enterobius vermicularis*

Number of ova	Source of worm	Approximate size of worm
14, 451	Stool (after gentian violet treatment)-----	9.7 mm by 0.4 mm.
14, 816	do-----	9.3 mm by 0.4 mm.
14, 703	do-----	9.2 mm by 0.3 mm.
14, 898	do-----	Not recorded.
16, 451	do-----	Do.
11, 024	Colon (from necropsy)-----	9.4 mm by 0.5 mm.
6, 345	do-----	9.4 mm by 0.4 mm.
10, 507	do-----	9.0 mm by 0.4 mm.
8, 506	do-----	9.0 mm by 0.4 mm.
8, 790	do-----	8.8 mm by 0.4 mm.
8, 706	do-----	8.8 mm by 0.4 mm.
12, 782	Rectum (direct extraction)-----	8.1 mm by 0.4 mm.
4, 902	do-----	7.5 mm by 0.4 mm.
7, 698	do-----	7.0 mm by 0.4 mm.
4, 672	do-----	6.7 mm by 0.3 mm.
6, 028	do-----	Not recorded.
13, 911	do-----	Do.
14, 206	do-----	Do.
16, 888	do-----	Do.
11, 810	Enema-----	9.0 mm by 0.4 mm.

Arithmetical mean: 11,105; mean of the extremes: 10,780.

<sup>1</sup> Leuckart (10), p. 317 and footnote (translation), p. 317:

"The eggs of our parasite have, as is well known, an oval shape and relatively large size (length=0.05 mm., greatest breadth=0.016 mm.), which nevertheless does not prevent their number from amounting, constantly, to between 10-12,000 in a female with a uterus only somewhat well filled."

Footnote: "If the body of our worm with a diameter of 0.4 mm. and a length of 5 mm. is assumed to be filled with eggs (globules of 0.04 mm.) as stated above, the number contained therein is calculated to be not less than 20,000!"

The foregoing figures are strikingly variable, ranging from a low count of 4,672 to a high count of 16,888. This variation might follow, for one thing, in worms collected from stools, as a result of oviposition having begun and continued to some extent. It might follow, in worms collected from the colon at necropsy, from the fact that worms in various stages of development are found there. However, in worms extracted directly from the rectum the great variation found was not anticipated. It seemed reasonable to assume that such worms had reached their peak in development; that oviposition had not occurred, and that any normal variation in the egg count of fully developed worms might be slight. Nevertheless, this last group

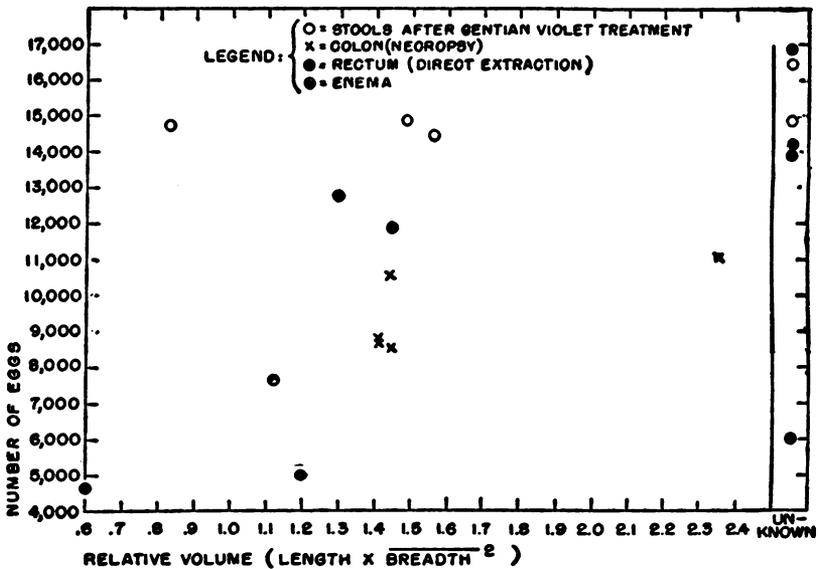


FIGURE 1.—Egg counts as correlated with worm sizes and source of worms.

showed the greatest variation and included, not only the smallest worm, but also the highest and lowest egg counts. In the one enema reported in the table, formaldehyde, in a concentration strong enough to fix the worms promptly and thus prevent oviposition, was added immediately to the enema returns. Unfortunately, it has not been possible to obtain more worms collected in this way.

Figure 1 indicates that worms having the highest development, both as to volume and to egg content, were obtained from stools after treatment with gentian violet. It shows also that some depletion of eggs may have occurred in worms extracted from the rectum; this may have occurred as the result of oviposition due to unusual stimulation attending the collection of the worms. However, the number of worms counted is not large enough to rule out the pos-

sibility that our selection of worms from any source might not be representative of the variation in egg counts for material from that source.

Whether this variation in egg content of gravid females represents a normal variation in individual egg production, or whether the variation is concurrent with the development of the worm, and following from the unintentional inclusion of females not yet completely gravid or partially depleted in our specimens, is not certain. Many published measurements of the female pinworm range from 8 to 13 mm by 0.3 to 0.5 mm, with no evidence as to the size range for gravid

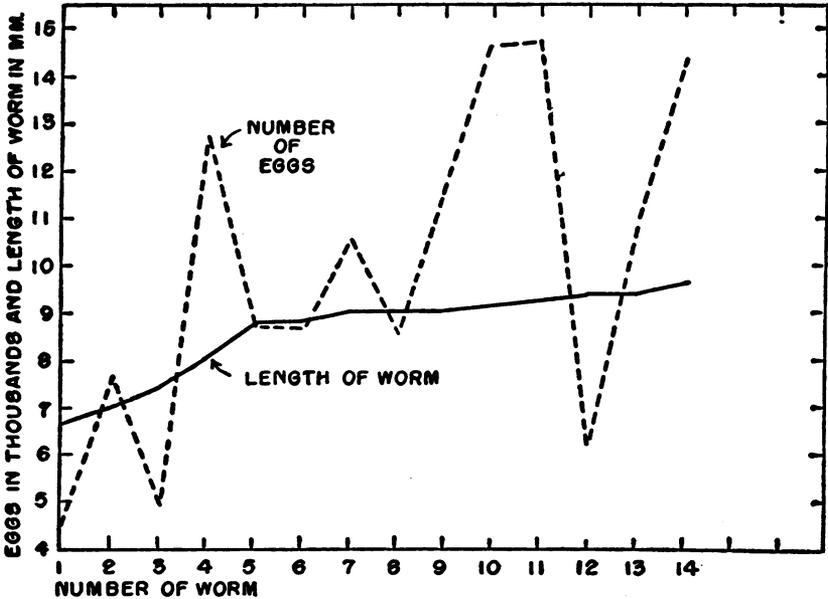


FIGURE 2.—Egg counts as correlated with length of worms.

females. The variation in egg count may be correlated to some extent with the size of the worm, and both may be highly variable in normal fully gravid females. This correlation, however, is not established in figure 2. The possibility is indicated, but the number of worms is too small to settle the question one way or another. Leuckart's and Cobb's (10, 11) estimates of 20,000 eggs are above our highest egg count for a measured worm—14,816 eggs in a worm 9.3 mm long; but it seems reasonably likely that a worm 13 mm long might well contain 20,000 eggs.

It is clear from previous findings and from this study that an infested household may have many thousands of eggs scattered about in it, and that the danger of infection from so much infective material is very real. Cobb (11), on the subject of "contagion" in oxyuriasis,

says: "The abundance of the eggs about dwellings, &c., is difficult to overstate, and is easily illustrated by a calculation. Reckoning 50 female worms to the individual [with 20,000 eggs in each female], an average which I am certain is exceeded in many localities, we have for a population of 250,000, the enormous number of two hundred and fifty thousand million eggs, which if distributed evenly over 20 square miles, would furnish *four to five hundred eggs to the square foot.*" If we take the arithmetical mean of our egg counts as 11,000 eggs in round numbers, then a comparatively light case of oxyuriasis with a migration of 5 worms daily would imply the presence, in a household, of 385,000 eggs within a week's time. Such figures would explain why we find a high incidence in our studies in Washington (3), and why this worm has been regarded by competent parasitologists for many years as the most common of all pathogenic animal parasites of man.

## SUMMARY

Counts, made by rather precise techniques, of the eggs present in 20 gravid females of *Enterobius vermicularis* show from 4,672 to 16,888 eggs per worm. The arithmetical mean is 11,105, and the mean of the extremes is 10,780. These figures, in connection with studies on the recovery of pinworm eggs from households, afford some explanation of the familial nature of oxyuriasis, and the status of pinworms as the most common of all the pathogenic worm parasites of man.

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## ROCKY MOUNTAIN SPOTTED FEVER

### Geographical and Seasonal Prevalence, Case Fatality, and Preventive Measures

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As is frequently the case with geographically named diseases, Rocky Mountain spotted fever is found far distant from the locality from which it received its name, or at least part of its name. When first identified, it was thought to be limited to the northwest mountainous section of the United States. For many years it was believed to be limited to the States west of the Mississippi River. In 1930, however, investigators of the United States Public Health Service discovered that the disease was occurring in the eastern part of the country, in the States along the Atlantic seaboard; and it is probable that it is found in other countries identified by other names.

Although the type of Rocky Mountain spotted fever found in the East was proved to be identical immunologically with the Western type, certain clinical variations were noted which indicated that the eastern form of the disease was somewhat less virulent than that found in some areas of the Western States, at least before prophylactic measures were discovered and adopted there. In all parts of the country the disease is transmitted to human beings principally by the bite of the wood tick, *Dermacentor*—the western disease by the species *andersoni* and the eastern type by the species *variabilis*, the common dog tick. Careful experimentation has shown that infected ticks pass the disease from one generation to the next; and thus there is provided a continuing reservoir of infection.

### SYMPTOMS

The descriptive part of the name of this disease comes from the characteristic irritating rash which accompanies it. In the typical case, as described by the director of the Rocky Mountain Laboratory of the United States Public Health Service, from 2 to 5 days elapse between the time when the patient is bitten by the infected tick and the appearance of the first symptoms. In milder cases, from 3 to 14 days may elapse. The onset of the disease is accompanied by a distinct chill, and usually certain other symptoms such as headache, sweating, redness of the eyes, pain in the abdomen, the bones, and the muscles,

and sometimes nosebleed and vomiting. This combination causes a very severe illness. Some patients may become delirious and show symptoms indicating that the brain and spinal cord are affected.

When the physician examines the patient with Rocky Mountain spotted fever he will likely find that the spleen and some of the lymph glands are enlarged, and will notice the typical rash. This rash gives a mottled appearance to the skin and is most often seen on the wrists, ankles, and less frequently on the back. Occasionally the eruption will be observed on the forehead. In some cases the disease is so severe that the rash, or eruption, is purplish red in appearance, which is due to release of blood into these areas.

The fever usually lasts two or three weeks, but may continue longer. If the condition becomes worse, the temperature goes higher and the fever is persistent. Along with the fever, the pulse becomes strong and fairly rapid. These patients are restless and find it difficult to sleep. The skin is oversensitive, and there may be pains along the course of the nerves.

Laboratory tests have been developed which easily differentiate Rocky Mountain spotted fever from scarlet fever, measles, typhoid fever, typhus fever, meningitis, encephalitis, or any other disease that it may resemble; and by such means it can be diagnosed with certainty.

#### GEOGRAPHICAL AND SEASONAL PREVALENCE

In table 1 are presented the number of cases reported to the Public Health Service and the number of deaths recorded by the Bureau of the Census for the years 1933-37, by States arranged according to geographical regions.

The areas of greatest prevalence of Rocky Mountain spotted fever in the United States during the 5 years 1933-37 are the Mountain and Pacific States and the South Atlantic States. Of the 2,190 cases reported for the entire country during those years, 1,435 cases, or 65.5 percent, occurred in the Mountain and Pacific States, and 601 cases, or 27.4 percent occurred in the South Atlantic group. These two areas combined accounted for 93 percent of the total number of cases reported for the entire country.

The known area of prevalence in the United States has gradually been extended to include all geographic regions, as shown in table 1, the New England group being the last to recognize its occurrence, two cases being reported in Rhode Island in 1937. In 1933, the disease was reported in 23 States; in 1934, in 25 States; in 1935, in 25 States; in 1936 in 28 States; and in 1937, in 31 States (including the District of Columbia in each year).

Rocky Mountain spotted fever has a characteristic seasonal curve in the United States, correlated with the habits and prevalence of the

tick and with the vacation season. The greatest numbers of cases are reported during the spring and summer months, when the adult ticks are seeking an animal host and normally increased outdoor activities and vacation time bring the period of maximum exposure of human beings to the sources of infection.

TABLE 1.—Cases of, and deaths from, Rocky Mountain spotted fever in the United States, 1933-37<sup>1</sup>

State	1933		1934		1935		1936		1937 <sup>2</sup>	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
<b>New England:</b>										
Maine.....	0	0	0	0	0	0	0	0	0	0
New Hampshire.....	0	0	0	0	0	0	0	0	0	0
Vermont.....	0	0	0	0	0	0	0	0	0	0
Massachusetts.....	0	0	0	0	0	0	0	0	0	0
Rhode Island.....	0	0	0	0	0	0	0	0	0	0
Connecticut.....	0	0	0	0	0	0	0	0	2	0
<b>Middle Atlantic:</b>										
New York.....	3	0	4	2	0	1	0	2	0	0
New Jersey.....	0	0	0	0	1	0	4	0	8	2
Pennsylvania.....	2	0	1	0	3	1	4	0	2	0
<b>East North Central:</b>										
Ohio.....	0	0	0	0	0	0	0	0	2	0
Indiana.....	1	0	0	0	0	0	0	0	1	0
Illinois.....	0	0	1	1	2	0	6	2	6	1
Michigan.....	0	0	0	0	0	0	0	0	0	0
Wisconsin.....	0	0	0	0	0	0	0	0	0	0
<b>West North Central:</b>										
Minnesota.....	1	0	0	0	1	0	1	0	0	0
Iowa.....	5	1	6	0	7	1	1	1	16	3
Missouri.....	0	0	0	1	0	0	0	0	0	0
North Dakota.....	0	0	0	0	2	0	0	0	1	0
South Dakota.....	2	2	5	1	11	0	2	2	2	2
Nebraska.....	0	0	0	0	1	0	0	0	0	0
Kansas.....	0	0	0	0	0	0	0	0	0	0
<b>South Atlantic:</b>										
Delaware.....	0	0	3	1	0	0	3	1	1	0
Maryland.....	55	3	33	5	33	5	32	5	33	6
District of Columbia.....	7	2	4	2	6	3	8	2	7	4
Virginia.....	23	4	47	8	44	8	50	7	54	9
West Virginia.....	0	1	0	0	5	1	2	2	2	0
North Carolina.....	27	5	34	8	21	6	32	8	27	4
South Carolina.....	0	0	0	1	2	0	0	0	1	0
Georgia.....	3	1	1	1	0	0	1	0	0	0
Florida.....	0	0	2	1	0	0	0	0	0	0
<b>East South Central:</b>										
Kentucky.....	0	0	2	0	0	0	3	1	1	0
Tennessee.....	2	1	3	2	1	0	4	0	9	0
Alabama.....	0	3	1	0	3	0	1	0	0	0
Mississippi.....	0	0	0	0	0	0	0	0	0	0
<b>West South Central:</b>										
Arkansas.....	0	0	0	1	0	0	0	0	3	0
Louisiana.....	0	0	0	0	0	0	0	0	0	0
Oklahoma.....	0	0	0	0	0	0	1	0	0	0
Texas.....	0	0	0	0	0	0	0	1	2	1
<b>Mountain:</b>										
Montana.....	67	15	74	11	126	20	65	15	31	4
Idaho.....	47	10	35	9	28	9	31	11	38	7
Wyoming.....	118	14	95	21	95	19	47	15	72	19
Colorado.....	14	5	5	2	27	2	8	2	16	0
New Mexico.....	0	0	0	0	0	0	0	0	2	0
Arizona.....	0	0	0	0	0	0	0	0	0	0
Utah.....	5	1	12	0	14	2	8	3	12	4
Nevada.....	15	1	5	1	5	0	10	2	8	2
<b>Pacific:</b>										
Washington.....	3	1	9	7	3	2	2	0	1	0
Oregon.....	50	5	58	9	40	8	34	6	48	4
California.....	16	1	16	1	10	2	5	1	5	0
<b>Total.....</b>	<b>466</b>	<b>76</b>	<b>456</b>	<b>96</b>	<b>491</b>	<b>89</b>	<b>362</b>	<b>87</b>	<b>415</b>	<b>72</b>

<sup>1</sup> The numbers of cases are those reported to the Public Health Service; the numbers of deaths are taken from the reports of the Bureau of the Census.

<sup>2</sup> Figures for 1937 are preliminary and incomplete.

Table 2 and figure 1 show the seasonal prevalence in the country as a whole and by the two geographic regions of greatest prevalence. The figures used in plotting the graphs are the average number of cases reported by months for the 5-year period 1933-37. (The data for 1937 are incomplete.)

TABLE 2.—Cases of Rocky Mountain spotted fever reported in the South Atlantic and Mountain and Pacific States, by months, 1933 to 1937

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<b>South Atlantic States:</b>												
1933.....					3	27	37	23	9	1	1	
1934.....	2				8	21	33	40	13		2	3
1935.....	2		1		8	20	32	29	11	1	1	4
1936.....	1			1	6	20	43	40	12	1	2	1
1937.....		1	1		10	25	42	29	12	1	2	1
<b>Total.....</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>35</b>	<b>114</b>	<b>187</b>	<b>161</b>	<b>57</b>	<b>4</b>	<b>8</b>	<b>9</b>
<b>Mountain and Pacific States:</b>												
1933.....			7	52	116	102	40	11	4	1	1	1
1934.....	2	6	29	79	120	45	13	6	2	3		
1935.....		1	14	41	101	108	53	8	2			
1936.....			3	33	87	62	14	7		1		2
1937.....			4	20	81	77	26	11	2	2	4	6
<b>Total.....</b>	<b>2</b>	<b>7</b>	<b>57</b>	<b>225</b>	<b>505</b>	<b>394</b>	<b>146</b>	<b>43</b>	<b>10</b>	<b>7</b>	<b>5</b>	<b>9</b>

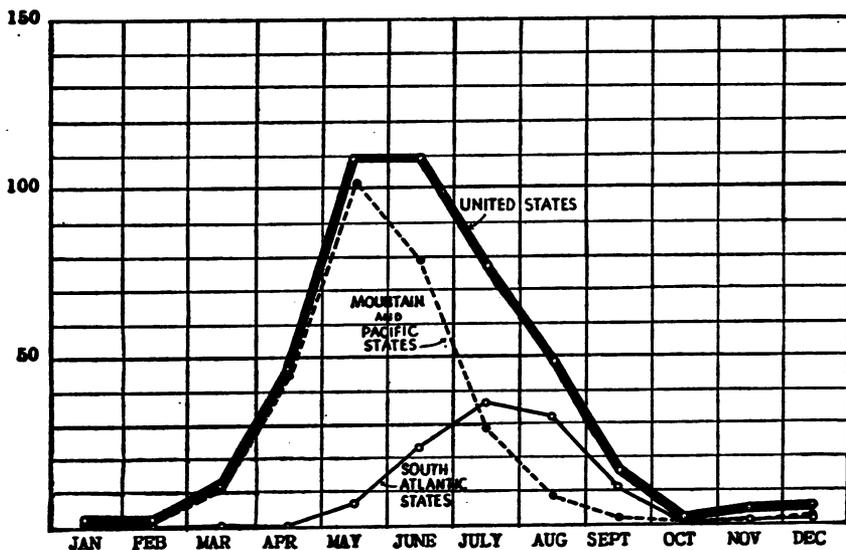


FIGURE 1.—Monthly averages of reported cases of Rocky Mountain spotted fever, 1933-37, inclusive.

The season of high incidence begins earlier and reaches its peak earlier in the western States than in the Atlantic region. In the Mountain and Pacific States the period of highest incidence begins in March, reaches the peak in May, and drops abruptly in June and July; while for the Atlantic States it apparently begins in May, reaches the peak in July, continues, though declines definitely, in August, and

drops abruptly in September and October. The monthly curve for the country as a whole reflects the influence of the seasonal prevalence of the disease in the Mountain and Pacific States, where the greatest incidence occurs.

A comparison of the case fatality rates for the western and eastern groups of States, based on the total number of cases reported to the Public Health Service and the number of deaths recorded by the Bureau of the Census for the 4 years 1933-37, shows only a slight difference. The case fatality rate, that is, the number of deaths per 100 cases, for the Mountain and Pacific States over this 5-year period is 19.4, and that for the South Atlantic States is 18.1. Both of these rates may be accepted only as a minimum, as there are probably many cases unrecognized or unreported. There is, of course, no means of evaluating this factor for either region. On the other hand, the Public Health Service prophylactic vaccine has been used for many years in the western States, where the virulent type of the disease occurs; and it has been shown that this preventive measure has greatly reduced the fatality rate in that area. In earlier years, before the vaccine was developed, the case fatality rate in some areas of the Rocky Mountain region was very high; 85 or 90 persons died out of every hundred contracting the disease naturally, while the rate was even higher in those who contracted the infection in the laboratory.

TABLE 3.—Case fatality rates of Rocky Mountain spotted fever for the South Atlantic States and the Mountain and Pacific States, 1933-36, inclusive

	Number of cases reported	Number of deaths	Case fatality rate—deaths per 100 cases
<b>South Atlantic States</b> .....	<b>469</b>	<b>86</b>	<b>18.1</b>
Delaware.....	6	2	33.3
Maryland.....	153	18	11.8
District of Columbia.....	25	9	36.0
Virginia.....	164	27	16.5
West Virginia (not used).....			
North Carolina.....	114	27	23.7
South Carolina (not used).....			
Georgia.....	5	2	40.0
Florida.....	2	1	50.0
<b>Mountain and Pacific States</b> .....	<b>1,293</b>	<b>233</b>	<b>19.4</b>
Montana.....	332	61	18.4
Idaho.....	141	39	27.7
Wyoming.....	355	69	19.4
Colorado.....	54	11	20.4
New Mexico.....	0	0	0
Arizona.....	0	0	0
Utah.....	39	6	15.4
Nevada.....	35	4	11.4
Washington.....	17	10	58.8
Oregon.....	182	28	15.4
California.....	48	5	10.4

Table 3 presents the case fatality rates for the two geographical groups as a whole and for the individual States. In certain instances the rates for States are high; but the greatest significance to be attached to these high rates is probably to emphasize the need for

better recognition and reporting of the disease and the fact that the value of such rates rests upon more complete reporting and the use of large numbers.

#### PREVENTION

Obviously the best way to avoid ticks and tick bites is to stay out of the woods and away from underbrush during the summer; but for those whose work or pleasure involves this exposure, some helpful advice may be given. Dr. R. R. Parker, of the United States Public Health Service, who has devoted a good many years of his life to the study of Rocky Mountain spotted fever, has given some practical suggestions for avoiding ticks.

Clothing should be selected which will prevent ticks from reaching and becoming attached to the skin. High boots, puttees, leggings, and socks may be worn over the trouser legs. If the ticks crawl up the outside of the clothing, they may be seen and easily removed. Those reaching the back of the neck should be removed as soon as they are felt. It is a good plan to feel the back of the neck occasionally for ticks when one is in a tick-infested region. Women who go into the woods should wear men's clothing of the kind just described. Ticks which become attached to the skin may be removed with tweezers or by the fingers and a piece of paper. At the present time there seems to be no material known that can be placed on the body or in the clothing which will repel ticks.

Rocky Mountain spotted fever is a disease for which there is no specific remedy. It is probably self-limited, and treatment is based on the symptoms. Officers of the Public Health Service have developed, and have prepared for several years, a prophylactic vaccine which offers considerable protection to persons bitten by infected ticks. This vaccine (Spencer-Parker) has been used extensively in the West and has reduced the case fatality of reported cases from 85 to 26 percent or less. Large quantities of this vaccine are prepared each year in the United States Public Health Service Rocky Mountain Laboratory at Hamilton, Mont., and many shepherders, foresters, members of the C. C. C. camps, and others, whose work requires them to go into infested regions, receive this protective inoculation. An attack of the disease also confers a high degree of immunity. It is not known exactly how long this immunity lasts, but it is believed that no authentic case of a second attack in man has been reported, and laboratory animals have always been found to be immune after a primary infection.

So far, spotted fever has not prevailed to a sufficient extent in the Eastern States to warrant widespread use of the vaccine. However, it is comforting to know that the material can be made available in the event that an undue extension of the disease in the East should make its

use desirable. As there is little that can be done in biological control of the disease by reducing the number of ticks in the woods, it behooves all persons who tramp and camp to keep ticks off the skin, as the best method of prevention is the avoidance of ticks in infested regions. However, lovers of the outdoor life may be relieved of considerable apprehension to know that only a few persons bitten by ticks develop Rocky Mountain spotted fever.

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### TYPHOID FEVER CASES IN INDIANA AND OTHER STATES TRACED TO CONTAMINATED WATER SUPPLY AT ANGOLA, IND.

Contaminated drinking water from a well near Angola, Ind., used by passengers of a bus line, has been found to be responsible for at least 52 cases of typhoid fever and 6 deaths in Indiana and several other States, according to information received from the Indiana State Board of Health. Cases in patients giving a history of having stopped off at Angola for meals when enroute by bus during the early part of April have been reported from several localities in the States of Ohio, New York, and Illinois, and two cases traced to this source have been reported from California. It is quite likely that other States than those so far heard from have had recent isolated cases of typhoid fever of undetermined origin which are also attributable to this source.

The onset of the majority of the cases so far reported in persons who had used this contaminated water supply occurred in April, and it is likely that only a few cases of this origin occurred in May, as use of the supply was stopped by the local health officer in the latter part of April.

The State Board of Health reported early in May that the situation was well in hand, and that the eating place which used the contaminated well water was being inspected daily by the local health officer. In addition, frequent visits were being made by a representative of the State board of health to insure that all precautionary measures were being carried out. It has been definitely demonstrated that the well received contamination from a leaking sewer which passed near the well pit. The State and local health authorities are now making a thorough investigation to determine the specific source of the infection.

In view of the lesson to be learned from such outbreaks, Dr. Verne K. Harvey, director of the Indiana State Board of Health, suggests the following remedial measures:

1. Establishment of full-time public-health units with adequate personnel to inspect all semipublic water supplies.
2. Strengthening of the laws regarding the inspection of water supplies.
3. Regular inspection and grading of sanitation and water supplies of all restaurants and other eating places.
4. Searching inspection of all interstate bus eating places. (This step has already been taken in Indiana.)

## DEATHS DURING WEEK ENDED MAY 28, 1938

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 28, 1938	Correspond- ing week, 1937
<b>Data from 87 large cities of the United States:</b>		
Total deaths.....	8, 133	1 8, 453
Average for 8 prior years.....	8, 351	-----
Total deaths, first 21 weeks of year.....	182, 893	203, 626
Deaths under 1 year of age.....	494	1 527
Average for 8 prior years.....	540	-----
Deaths under 1 year of age, first 21 weeks of year.....	11, 296	12, 511
<b>Data from industrial insurance companies:</b>		
Policies in force.....	68, 308, 527	69, 764, 846
Number of death claims.....	12, 038	13, 172
Death claims per 1,000 policies in force, annual rate.....	9. 2	9. 8
Death claims per 1,000 policies, first 21 weeks of year, annual rate.....	9. 9	11. 1

<sup>1</sup> Data for 86 cities.

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (.....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

*Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 4, 1938, and June 5, 1937*

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937
<b>New England States:</b>								
Maine.....	0	0	.....	.....	105	25	0	0
New Hampshire.....	0	0	.....	.....	83	157	0	0
Vermont.....	0	0	.....	.....	79	2	0	0
Massachusetts.....	2	3	.....	.....	430	647	1	3
Rhode Island.....	0	0	.....	.....	7	81	0	0
Connecticut.....	0	9	.....	3	97	149	0	0
<b>Middle Atlantic States:</b>								
New York.....	17	35	.....	12 6	3,498	1,653	1	11
New Jersey.....	7	7	.....	5 6	724	1,741	0	1
Pennsylvania.....	33	24	.....	.....	1,846	2,058	3	8
<b>East North Central States:</b>								
Ohio.....	21	15	.....	22	1,491	2,977	5	5
Indiana.....	25	7	.....	6 16	442	935	0	1
Illinois.....	31	32	.....	14 15	1,059	454	3	2
Michigan <sup>1</sup> .....	6	11	.....	1	2,780	181	2	2
Wisconsin.....	3	2	.....	27 23	2,703	98	1	0
<b>West North Central States:</b>								
Minnesota.....	4	4	.....	1	375	17	0	1
Iowa.....	2	2	.....	4 2	274	7	0	0
Missouri.....	11	15	.....	6 38	137	71	3	1
North Dakota.....	0	2	.....	6 36	67	2	1	0
South Dakota.....	1	0	.....	.....	.....	4	1	0
Nebraska.....	4	0	.....	.....	252	27	1	0
Kansas.....	3	3	.....	3	383	19	0	1
<b>South Atlantic States:</b>								
Delaware.....	0	0	.....	.....	7	37	0	1
Maryland <sup>2</sup> .....	1	5	.....	2 2	16	259	0	3
District of Columbia.....	6	4	.....	2 1	44	110	2	4
Virginia <sup>3</sup> .....	5	8	.....	.....	607	379	1	12
West Virginia.....	4	7	.....	27 11	339	59	3	3
North Carolina <sup>4</sup> .....	7	12	.....	1 1	948	309	1	5
South Carolina <sup>5</sup> .....	2	2	.....	77 63	128	64	2	1
Georgia <sup>6</sup> .....	3	0	.....	.....	153	.....	0	0
Florida.....	7	10	.....	1 3	44	.....	2	1

See footnotes at end of table.

*Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 4, 1938, and June 5, 1937—Continued*

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937
<b>East South Central States:</b>								
Kentucky.....	10	10	3	8	126	475	3	5
Tennessee.....	1	3	18	20	104	120	3	5
Alabama.....	6	11	9	27	176	33	5	8
Mississippi.....	3	2					1	0
<b>West South Central States:</b>								
Arkansas.....	3	3	8	12	180	3	0	0
Louisiana.....	4	8	4	9	27	9	0	0
Oklahoma.....	9	6	25	6	171	48	0	1
Texas.....	35	36	181	156	176	389	0	5
<b>Mountain States:</b>								
Montana.....	1	0			90	3	1	0
Idaho.....	1	0		4	7	25	0	2
Wyoming.....	1	0			16	5	0	0
Colorado.....	18	1			178	23	1	1
New Mexico.....	1	1		1	16	52	0	0
Arizona.....	2	1	21	21	16	33	0	0
Utah.....	0	0			344	80	0	0
<b>Pacific States:</b>								
Washington.....	0	10			20	40	1	0
Oregon.....	2	0	27	8	54	4	1	0
California.....	37	21	11	50	624	305	2	3
<b>Total.....</b>	<b>339</b>	<b>332</b>	<b>490</b>	<b>570</b>	<b>21,443</b>	<b>14,169</b>	<b>51</b>	<b>96</b>
<b>First 22 weeks of year.....</b>	<b>11,032</b>	<b>10,330</b>	<b>41,924</b>	<b>271,027</b>	<b>682,231</b>	<b>191,060</b>	<b>1,690</b>	<b>3,423</b>

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fever		Whooping cough
	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938
<b>New England States:</b>									
Maine.....	0	0	8	22	0	0	1	2	22
New Hampshire.....	0	0	22	32	0	0	0	0	
Vermont.....	1	0	9	6	0	0	2	0	20
Massachusetts.....	0	1	326	217	0	0	1	1	143
Rhode Island.....	0	0	26	45	0	0	0	1	24
Connecticut.....	0	0	73	107	0	0	0	2	76
<b>Middle Atlantic States:</b>									
New York.....	0	4	519	566	0	0	1	8	433
New Jersey.....	0	0	97	131	0	0	1	2	191
Pennsylvania.....	0	0	292	434	0	0	9	6	184
<b>East North Central States:</b>									
Ohio.....	0	2	182	508	69	2	8	3	133
Indiana.....	0	0	75	137	39	30	3	1	30
Illinois.....	0	0	320	401	15	22	5	8	230
Michigan.....	0	1	271	418	1	2	6	5	257
Wisconsin.....	2	0	144	207	2	2	3	3	191
<b>West North Central States:</b>									
Minnesota.....	0	0	78	117	16	26	1	0	45
Iowa.....	0	0	64	107	21	22	1	0	34
Missouri.....	0	1	154	196	48	30	8	9	38
North Dakota.....	0	0	33	23	19	21	2	0	25
South Dakota.....	0	0	4	24	22	2	0	0	3
Nebraska.....	0	2	14	54	1	4	0	0	14
Kansas.....	0	0	57	87	23	13	1	3	134
<b>South Atlantic States:</b>									
Delaware.....	0	0	3	2	0	0	1	0	9
Maryland.....	0	0	48	20	0	0	5	7	47
District of Columbia.....	0	0	11	3	0	0	1	2	12
Virginia.....	0	0	23	10	0	0	6	7	147
West Virginia.....	1	0	16	56	1	1	5	3	104
North Carolina.....	2	0	13	20	6	1	8	3	240

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 4, 1938, and June 5, 1937—Continued

Division and State	Pollomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fever		Whooping cough
	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	Week ended June 4, 1938	Week ended June 5, 1937	
<b>South Atlantic States—Con.</b>									
South Carolina <sup>1</sup> .....	0	1	5	5	0	0	8	12	69
Georgia <sup>2</sup> .....	0	1	2	6	0	0	21	6	44
Florida.....	3	0	1	0	0	0	9	1	20
<b>East South Central States:</b>									
Kentucky.....	1	2	13	35	2	0	4	8	43
Tennessee.....	2	0	31	15	1	0	9	4	66
Alabama <sup>3</sup> .....	1	0	6	4	0	0	13	2	26
Mississippi <sup>3</sup> .....	0	9	2	1	1	0	6	2	-----
<b>West South Central States:</b>									
Arkansas.....	1	1	1	6	13	0	16	10	41
Louisiana.....	2	1	2	15	1	0	11	16	10
Oklahoma.....	0	0	21	19	32	8	11	7	60
Texas <sup>4</sup> .....	0	3	70	84	34	5	34	24	373
<b>Mountain States:</b>									
Montana <sup>5</sup> .....	0	0	12	12	5	15	1	0	43
Idaho <sup>5</sup> .....	0	0	6	10	5	1	1	3	5
Wyoming <sup>5</sup> .....	0	0	7	10	0	3	0	2	10
Colorado <sup>5</sup> .....	1	0	37	30	4	3	7	0	21
New Mexico.....	0	0	9	14	0	0	0	3	12
Arizona.....	0	0	5	13	9	0	3	0	24
Utah <sup>5</sup> .....	0	0	14	8	0	0	0	0	80
<b>Pacific States:</b>									
Washington.....	0	0	15	29	22	1	1	1	113
Oregon <sup>5</sup> .....	0	1	19	29	28	20	3	4	38
California <sup>5</sup> .....	2	6	155	175	18	8	7	11	421
<b>Total.....</b>	<b>19</b>	<b>36</b>	<b>3,315</b>	<b>4,470</b>	<b>458</b>	<b>242</b>	<b>244</b>	<b>192</b>	<b>4,305</b>
<b>First 22 weeks of year.....</b>	<b>427</b>	<b>468</b>	<b>120,897</b>	<b>145,153</b>	<b>10,894</b>	<b>6,750</b>	<b>2,966</b>	<b>2,606</b>	<b>94,258</b>

<sup>1</sup> New York City only.  
<sup>2</sup> Period ended earlier than Saturday.  
<sup>3</sup> Rocky Mountain spotted fever, week ended June 4, 1938, 20 cases as follows: Maryland, 2; Virginia, 3; Montana, 1; Idaho, 2; Wyoming, 6; Utah, 1; Oregon, 2; California, 3.  
<sup>4</sup> Typhus fever, week ended June 4, 1938, 33 cases as follows: North Carolina, 1; South Carolina, 7; Georgia, 10; Alabama, 6; Texas, 9.  
<sup>5</sup> Colorado tick fever, week ended June 4, 1938, 6 cases as follows: Wyoming, 1; Colorado, 5.

**SUMMARY OF MONTHLY REPORTS FROM STATES**

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Menin- gococ- cus menin- gitis	Diph- theria	Influ- enza	Ma- laria	Meas- les	Pel- lagra	Poli- mye- litis	Scarlet fever	Small- pox	Ty- phoid fever
<i>April 1938</i>										
Alaska.....	0	0	118	-----	1	-----	0	0	0	1
Colorado.....	6	42	119	-----	1,579	-----	2	202	15	6
Massachusetts.....	7	16	-----	2	1,438	-----	0	1,639	0	2
<i>May 1938</i>										
Arkansas.....	1	24	107	263	883	84	2	17	20	26
Connecticut.....	1	26	11	-----	235	-----	0	440	0	6
Delaware.....	0	7	-----	-----	59	-----	0	31	0	1
Iowa.....	1	11	8	-----	1,300	-----	3	435	121	10
North Carolina.....	5	45	57	47	7,127	125	3	72	10	32

## Summary of monthly reports from States—Continued

April 1938		April 1938—Continued		May 1938—Continued	
Chickenpox:	Cases	Trichinosis:	Cases	Paratyphoid fever:	Cases
Alaska.....	13	Massachusetts.....	4	Arkansas.....	1
Colorado.....	348	Undulant fever:		Connecticut.....	2
Massachusetts.....	1,300	Colorado.....	3	Rabies in animals:	
Colorado tick fever:		Massachusetts.....	2	Arkansas.....	31
Colorado.....	1	Whooping cough:		Connecticut.....	6
Dysentery:		Alaska.....	1	Rocky Mountain spotted fever:	
Alaska (bacillary).....	4	Colorado.....	150	Delaware.....	1
Colorado (amoebic).....	2	Massachusetts.....	421	North Carolina.....	2
Massachusetts (bacillary).....	14			Septic sore throat:	
Encephalitis, epidemic or lethargic:				Arkansas.....	13
Colorado.....	1	Chickenpox:		Connecticut.....	18
Massachusetts.....	1	Arkansas.....	52	Iowa.....	5
German measles:		Connecticut.....	465	North Carolina.....	7
Massachusetts.....	104	Delaware.....	69	Tetanus:	
Impetigo contagiosa:		Iowa.....	284	Arkansas.....	1
Alaska.....	1	North Carolina.....	316	Connecticut.....	1
Lead poisoning:		Conjunctivitis, infectious:		Trachoma:	
Massachusetts.....	1	Connecticut.....	6	Arkansas.....	16
Mumps:		Dysentery:		Trichinosis:	
Alaska.....	64	Arkansas (amoebic).....	1	Connecticut.....	4
Colorado.....	58	Arkansas (bacillary).....	44	Tularaemia:	
Massachusetts.....	1,107	Connecticut (bacillary).....	2	Arkansas.....	7
Ophthalmia neonatorum:		Encephalitis, epidemic or lethargic:		North Carolina.....	2
Massachusetts.....	84	Arkansas.....	3	Typhus fever:	
Paratyphoid fever:		Iowa.....	1	Connecticut.....	1
Massachusetts.....	6	German measles:		North Carolina.....	3
Rabies in animals:		Connecticut.....	54	Undulant fever:	
Massachusetts.....	5	Delaware.....	1	Arkansas.....	6
Rocky Mountain spotted fever:		Iowa.....	4	Connecticut.....	13
Colorado.....	1	North Carolina.....	26	Iowa.....	6
Septic sore throat:		Mumps:		North Carolina.....	2
Alaska.....	3	Arkansas.....	32	Vincent's infection:	
Colorado.....	16	Connecticut.....	787	North Carolina.....	3
Massachusetts.....	28	Delaware.....	74	Whooping cough:	
Tetanus:		Iowa.....	129	Arkansas.....	147
Massachusetts.....	3	Ophthalmia neonatorum:		Connecticut.....	497
Trachoma:		Connecticut.....	1	Delaware.....	35
Alaska.....	1	North Carolina.....	2	Iowa.....	154
				North Carolina.....	1,602

**PLAGUE INFECTION FOUND IN FLEAS IN SANTA CRUZ COUNTY, CALIF.**

Under date of May 11, 1938, Dr. W. M. Dickie, Director of Public Health of California, reported that plague infection had been proved in 18 fleas collected at the mouth of a squirrel burrow in Santa Cruz County, Calif.

**PLAGUE INFECTION IN GROUND SQUIRREL AND IN FLEAS, LOUSE, AND TICK FROM GROUND SQUIRRELS IN GRANT COUNTY, OREG.**

Under date of June 1, 1938, Senior Surgeon C. R. Eskey, reported plague infection proved in Grant County, Oreg., as follows:

In tissue from 1 ground squirrel (*Citellus oregonus*) shot May 21, 1 to 3 miles south of Mount Vernon, Grant County, Oregon.

In 26 fleas, 1 louse, and 1 tick collected from 41 ground squirrels (*Citellus oregonus*) shot May 21, 1 to 4 miles south of Mount Vernon, Grant County, Oreg.

**PLAGUE INFECTION IN GROUND SQUIRREL IN BANNOCK COUNTY, IDAHO**

Under date of June 4, 1938, Past Asst. Surg. V. H. Haas reported plague infection had been proved in tissue from 1 ground squirrel (*Citellus armatus*) shot May 25, 1938, 16 miles north of Lava Hot Springs, Bannock County, Idaho.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 28, 1938

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
<b>Data for 90 cities:</b>											
5-year average	166	89	34	5,884	569	2,006	16	417	32	1,348	-----
Current week <sup>1</sup>	104	36	19	5,728	439	1,404	21	352	39	1,346	-----
<b>Maine:</b>											
Portland	0	-----	0	14	2	0	0	0	0	5	23
<b>New Hampshire:</b>											
Concord	0	-----	0	0	0	0	0	0	0	0	14
Manchester	0	-----	0	0	1	4	0	0	0	0	24
Nashua	0	-----	0	0	0	2	0	0	0	0	6
<b>Vermont:</b>											
Barre	0	-----	0	0	0	0	0	0	0	0	1
Burlington	0	-----	0	7	0	1	0	0	0	0	9
Rutland	0	-----	0	0	1	0	0	0	0	0	8
<b>Massachusetts:</b>											
Boston	2	-----	1	230	25	109	0	8	0	26	198
Fall River	0	-----	0	0	3	1	0	2	0	0	35
Springfield	0	-----	0	30	2	0	0	0	0	11	27
Worcester	0	-----	0	1	4	23	0	2	0	10	50
<b>Rhode Island:</b>											
Pawtucket	0	-----	0	0	2	2	0	0	0	0	27
Providence	0	-----	0	0	8	10	0	1	0	12	55
<b>Connecticut:</b>											
Bridgeport	0	1	0	2	0	2	0	0	1	0	29
Hartford	0	-----	2	4	3	14	0	1	0	2	42
New Haven	0	-----	0	9	3	2	0	2	2	16	42
<b>New York:</b>											
Buffalo	0	-----	0	6	7	48	0	4	0	3	142
New York	21	2	3	1,889	89	241	0	85	5	260	1,412
Rochester	0	1	0	21	4	22	0	3	0	3	77
Syracuse	0	-----	0	67	3	7	0	2	0	4	51
<b>New Jersey:</b>											
Camden	0	-----	0	4	4	7	0	0	0	2	27
Newark	0	1	0	14	6	11	0	7	0	50	114
Trenton	0	-----	1	0	4	9	0	2	1	3	36
<b>Pennsylvania:</b>											
Philadelphia	3	-----	1	432	21	102	0	22	5	36	492
Pittsburgh	6	-----	0	26	12	27	0	7	0	27	148
Reading	0	-----	0	24	1	0	0	1	0	0	24
Scranton	0	-----	-----	6	-----	5	-----	-----	0	2	-----
<b>Ohio:</b>											
Cincinnati	5	-----	0	7	6	8	0	4	1	3	116
Cleveland	1	11	0	219	13	31	0	10	0	64	169
Columbus	0	-----	0	19	5	5	0	1	0	2	73
Toledo	1	2	1	98	1	4	0	6	0	12	73
<b>Indiana:</b>											
Anderson	1	-----	0	17	0	0	0	0	0	0	7
Fort Wayne	1	-----	0	7	1	10	0	0	1	0	22
Indianapolis	1	-----	0	119	11	12	0	1	0	3	101
Muncie	0	-----	0	0	0	0	0	0	0	0	7
South Bend	0	-----	0	53	0	0	2	0	0	2	15
Terre Haute	0	-----	0	2	0	1	1	0	0	0	15
<b>Illinois:</b>											
Alton	0	-----	0	0	1	1	0	0	0	0	10
Chicago	17	2	0	192	24	198	3	33	1	76	631
Elgin	0	-----	0	0	1	2	0	0	0	0	9
Moline	0	-----	0	2	0	1	0	0	0	1	7
Springfield	0	-----	0	2	0	3	1	0	0	0	24
<b>Michigan:</b>											
Detroit	3	-----	1	229	10	132	0	18	0	149	234
Flint	0	-----	0	106	7	22	0	0	0	3	31
Grand Rapids	0	-----	0	215	4	17	0	0	0	2	35
<b>Wisconsin:</b>											
Kenosha	0	-----	0	131	0	2	0	0	0	2	6
Madison	0	-----	0	409	0	5	0	0	0	2	14
Milwaukee	0	-----	0	33	5	33	9	4	1	55	110
Racine	1	-----	0	147	0	7	0	0	0	11	8
Superior	0	-----	0	4	0	1	0	0	0	0	7

<sup>1</sup> Figures for St. Paul, Minn., and Raleigh, N. C., estimated; reports not received.

## City reports for week ended May 28, 1938—Continued

State and city	Diph- theria cases	Influenza		Mea- sles cases	Pneu- monia deaths	Scar- let fever cases	Small- pox cases	Tuber- culosis deaths	Ty- phoid fever cases	Whoop- ing cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth.....	0		0	13	1	0	0	1	0	1	28
Minneapolis.....	0		0	246	4	14	6	1	0	8	110
St. Paul.....											
Iowa:											
Cedar Rapids.....	0			10		2	0		0	1	
Davenport.....	0			0		1	0		0	0	
Des Moines.....	0		0	46	0	23	0	0	0	1	35
Sioux City.....	0			52		2	0		0	6	
Waterloo.....	0			13		4	0		0	1	
Missouri:											
Kansas City.....	1		0	4	2	10	0	5	1	0	89
St. Joseph.....	0		0	3	2	1	0	0	0	0	24
St. Louis.....	1		0	4	5	49	0	11	0	6	247
North Dakota:											
Fargo.....	0		0	1	1	0	0	1	0	3	5
Grand Forks.....	0			21		2	0		0	1	
Minot.....	0		0	1	0	0	0	0	0	1	5
South Dakota:											
Aberdeen.....	0			0		4	0		0	11	
Nebraska:											
Lincoln.....	1			33		5	0		0	4	
Omaha.....	0		0	236	7	1	0	2	0	1	62
Kansas:											
Lawrence.....	0		0	37	0	0	0	0	0	3	5
Topeka.....	0		0	74	1	0	0	0	0	42	4
Wichita.....	0		0	29	2	1	0	1	0	9	33
Delaware:											
Wilmington.....	1		0	3	1	2	0	0	1	6	23
Maryland:											
Baltimore.....	4	1	1	34	9	53	0	7	1	46	190
Cumberland.....	0		0	8	0	0	0	0	0	0	10
Frederick.....	0		0	0	0	0	0	0	0	0	3
Dist. of Col.:											
Washington.....	11		0	19	11	15	0	10	4	9	153
Virginia:											
Lynchburg.....	0		0	0	1	1	0	0	0	3	14
Norfolk.....	0	1	0	49	0	3	0	2	0	3	25
Richmond.....	0		0	147	7	1	0	0	0	0	49
Roanoke.....	1		0	3	0	3	0	0	1	1	14
West Virginia:											
Charleston.....	0		0	0	2	0	0	1	0	2	12
Huntington.....	0			0		0	0		0	0	
Wheeling.....	0		0	20	0	2	0	0	0	2	17
North Carolina:											
Gastonia.....	0			16		0	0		0	0	
Raleigh.....											
Wilmington.....	0		0	11	0	0	0	1	0	12	9
Winston-Salem.....	0		0	38	1	0	0	3	0	31	16
South Carolina:											
Charleston.....	1		0	0	3	0	0	2	0	0	28
Florence.....	0		0	15	0	0	0	0	0	0	10
Greenville.....	0		0	11	2	0	0	2	0	7	11
Georgia:											
Atlanta.....	0	4	1	6	5	6	0	5	0	18	91
Brunswick.....	0		0	16	2	0	0	0	0	0	4
Savannah.....	0	1	0	9	0	0	0	2	1	5	31
Florida:											
Miami.....	0		0	5	4	0	0	2	0	2	35
Tampa.....	2		0	12	2	0	0	1	1	0	28
Kentucky:											
Ashland.....	0			0		0	0	0	0	0	
Covington.....	0		0	0	1	0	0	0	0	4	11
Lexington.....	0		0	1	0	0	0	0	0	0	21
Louisville.....	4		0	63	4	3	0	3	0	8	64
Tennessee:											
Knoxville.....	0	1	0	24	4	4	0	1	0	8	32
Memphis.....	0		0	2	6	3	0	7	0	6	80
Nashville.....	0		1	27	4	3	0	2	1	15	50
Alabama:											
Birmingham.....	0	2	0	16	0	4	0	4	1	3	62
Mobile.....	0		1	0	1	0	0	2	0	0	35
Montgomery.....	1			19		0	0		0	1	
Arkansas:											
Fort Smith.....	0			3		0	0		2	0	
Little Rock.....	0		0	0	4	0	0	1	0	0	

City reports for week ended May 28, 1938—Continued

State and city	Diphtheria cases		Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
	Cases	Deaths	Cases	Deaths								
Louisiana:												
Lake Charles.....	0	0	0	0	0	0	0	0	0	0	0	5
New Orleans.....	3	1	1	3	11	4	1	9	2	0	0	136
Shreveport.....	0	0	0	1	3	0	0	3	1	0	0	33
Oklahoma:												
Muskogee.....	0	0	0	0	0	0	0	0	0	0	0	---
Oklahoma City.....	0	0	0	3	2	1	0	2	2	0	0	36
Tulsa.....	0	0	0	156	1	0	0	0	0	0	15	---
Texas:												
Dallas.....	1	2	2	4	2	10	0	4	0	10	10	57
Fort Worth.....	0	0	0	1	0	1	0	2	0	13	13	31
Galveston.....	0	0	0	1	0	0	0	0	0	1	1	7
Houston.....	3	1	2	2	2	3	5	6	2	0	0	62
San Antonio.....	0	0	0	1	4	2	0	0	2	1	1	79
Montana:												
Billings.....	0	0	0	0	1	0	0	0	0	0	0	7
Great Falls.....	0	0	0	4	2	0	0	0	0	17	17	10
Helena.....	0	0	0	1	0	0	0	0	0	1	1	1
Missoula.....	0	0	0	0	1	0	0	0	0	1	1	11
Idaho:												
Boise.....	0	0	0	0	0	2	1	1	1	1	1	8
Colorado:												
Colorado Springs.....	0	0	0	3	1	0	1	2	0	2	2	16
Denver.....	3	0	0	37	5	14	0	5	0	5	5	74
Pueblo.....	1	0	0	33	0	2	0	0	1	1	1	13
New Mexico:												
Albuquerque.....	0	0	0	2	1	1	0	3	0	0	0	12
Utah:												
Salt Lake City.....	1	1	1	242	0	7	0	0	0	8	8	48
Washington:												
Seattle.....	0	1	1	1	2	0	0	3	0	74	74	110
Spokane.....	0	0	0	0	2	0	0	1	0	19	19	49
Tacoma.....	0	0	0	0	2	5	0	0	0	5	5	36
Oregon:												
Portland.....	0	1	0	20	4	15	1	0	0	2	2	103
Salem.....	0	3	0	3	---	1	0	0	0	0	0	---
California:												
Los Angeles.....	8	5	0	53	10	43	1	19	0	26	26	285
Sacramento.....	0	0	0	32	1	3	0	4	0	24	24	35
San Francisco.....	1	2	0	5	8	14	0	18	0	72	72	155

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:							
Buffalo.....	1	2	0	Louisiana:			
New York.....	1	0	0	New Orleans.....	0	0	4
Pennsylvania:							
Philadelphia.....	2	0	0	Shreveport.....	0	2	0
Ohio:							
Cleveland.....	1	0	0	New Mexico:			
Michigan:							
Detroit.....	2	0	0	Albuquerque.....	0	1	0
District of Columbia:							
Washington.....	0	1	0	Washington:			
Alabama:							
Birmingham.....	2	0	0	Spokane.....	1	0	0
Montgomery.....	0	0	2	Oregon:			
California:							
				Portland.....	1	0	0
				San Francisco.....	1	0	0

*Encephalitis, epidemic or lethargic.*—Cases: New York, 2; Trenton, 1; Baltimore, 1; Birmingham, 1; Los Angeles, 1; San Francisco, 1.

*Pellagra.*—Cases: Winston-Salem, 1; Atlanta, 3; Birmingham, 3; New Orleans, 1.

*Typhus fever.*—Cases: Savannah, 1; Houston, 1.

## FOREIGN AND INSULAR

### CANADA

*Provinces—Communicable diseases—2 weeks ended May 21, 1938.—*  
 During the 2 weeks ended May 21, 1938, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia <sup>1</sup>	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				6				2		8
Chickenpox		9	8	189	435	162	59	18	179	1,059
Diphtheria		2	2	62	6	5	5	1	1	84
Dysentery				1	2					3
Erysipelas				16	2	7		3	2	30
Influenza				2	41	15			7	65
Lethargic encephalitis					1					1
Measles		39	2	251	934	23	25	46	17	1,337
Mumps		6	2		258	158	4	17	12	457
Paratyphoid fever		1						2	1	4
Pneumonia		2			50				13	65
Poliomyelitis				2	1	1	1			5
Scarlet fever		30	11	133	143	45	73	64	47	546
Trachoma						1			1	2
Tuberculosis	3	8	50	150	83	28	48	5	28	403
Typhoid fever		2	4	31	1	8	1	3		50
Undulant fever					1					1
Whooping cough		17		70	156	47		12	122	424

<sup>1</sup> For 2 weeks ended May 25, 1938

### FINLAND

*Communicable diseases—April 1938.—* During the month of April 1938, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	189	Poliomyelitis	9
Dysentery	1	Scarlet fever	1,082
Influenza	21,629	Typhoid fever	41
Lethargic encephalitis	3	Undulant fever	3
Paratyphoid fever	10		

## FRANCE

*Vital statistics—Year 1937—Comparative.*—Following are vital statistics for France for the years 1937 and 1936:

	1937	1936
Number of marriages.....	274, 122	279, 743
Number of live births.....	616, 863	630, 059
Number of stillbirths.....	23, 006	23, 663
Total deaths.....	628, 603	642, 139
Deaths under 1 year of age.....	40, 064	42, 243

## SCOTLAND

*Vital statistics—Quarter ended March 31, 1938.*—Following are vital statistics for Scotland for the quarter ended March 31, 1938:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Population.....	4, 985, 300	-----	Deaths from—Continued.		
Number of marriages.....	7, 891	6. 4	Influenza.....	164	0. 13
Births.....	22, 237	18. 1	Measles.....	289	. 24
Deaths.....	17, 449	14. 2	Pneumonia.....	1, 341	1. 09
Deaths under 1 year of age.....	1, 790	1. 50	Scarlet fever.....	39	. 03
Deaths from:			Tuberculosis.....	947	. 77
Cerebrospinal fever.....	35	. 03	Whooping cough.....	42	. 03
Diphtheria.....	141	. 11			

<sup>1</sup> Per 1,000 live births.

*Vital statistics—Year 1937.*—Following are provisional vital statistics for Scotland for the year 1937:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Population.....	4, 979, 500	-----	Deaths from—Continued.		
Marriages.....	38, 345	7. 7	Heart disease.....	14, 358	-----
Births.....	87, 812	17. 6	Influenza.....	2, 693	-----
Deaths.....	63, 942	13. 9	Measles.....	119	-----
Deaths under 1 year of age.....	7, 050	1. 80	Nephritis, acute and chronic.....	1, 886	-----
Maternal mortality.....		14. 8	Pneumonia (all forms).....	4, 858	-----
Deaths from:			Puerperal sepsis.....	144	-----
Appendicitis.....	451	-----	Scarlet fever.....	123	-----
Cancer.....	7, 811	-----	Suicide.....	452	-----
Cerebral hemorrhage.....	6, 411	-----	Tuberculosis.....	3, 663	-----
Cerebrospinal fever.....	144	-----	Typhoid fever and paratyphoid fever.....	16	-----
Cirrhosis of the liver.....	196	-----	Whooping cough.....	717	-----
Diabetes mellitus.....	867	-----			
Diarrhea (all ages).....	1, 073	-----			
Diphtheria.....	426	-----			

<sup>1</sup> Per 1,000 live births.

**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER**

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 27, 1938, pages 890-893. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

**Cholera**

*China.*—During the week ended May 28, 1938, cholera was reported in China as follows: Hong Kong, 2 cases; Shanghai, 18 cases; Swatow, 4 cases.

**Plague**

*Peru.*—During the month of April 1938, 2 cases of plague were reported in Libertad Department, and 1 case, with 1 death, in Lima Department, Peru.

*United States.*—Reports of plague infection in fleas in Santa Cruz County, Calif., in a ground squirrel in Bannock County, Idaho, and in a ground squirrel and ground squirrel parasites in Grant County, Oreg., appear on page 995 of this issue of the PUBLIC HEALTH REPORTS.

**Smallpox**

*Iraq—Baghdad.*—During the week ended May 28, 1938, 1 case of smallpox was reported in Baghdad, Iraq.

*Honduras—Tela.*—During the week ended May 28, 1938, 1 case of smallpox was reported in Tela, Honduras.

**Yellow Fever**

*Nigeria.*—On May 27, 1938, 1 case of yellow fever was reported in Igbaja, and 1 case in Iragbiyin, Nigeria.

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